

THE
SURGICAL CLINICS
OF
JOHN B. MURPHY, M.D.

Bert H. Stuehler Jr.



W. B. Nilsen

July 1913.



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FRONTISPIECE



Sarcoma of upper end of tibia, not involving the articular surface. Just below the inner tuberosity the bone was eroded. The tumor is split open. A fragment of apparently normal bone may be seen on the upper edge.

VOLUME II

NUMBER 3

THE
SURGICAL CLINICS
OF
JOHN B. MURPHY, M.D.
AT
MERCY HOSPITAL, CHICAGO

JUNE, 1913

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NOTE: The August, 1913, number of the CLINICS will contain a full and complete discussion of Vaccine Therapy from the standpoint of the clinician, with the technic and results obtained in 150 cases in the service of Dr. Murphy at Mercy Hospital. This number will also contain a series of skiagrams, ten in all, showing the circulation in and around all the important joints of the body. Each artery will be numbered and named in both the old and the new nomenclature. This series is very graphic and absolutely unique.

OBTURATION ILEUS: OBSTRUCTION DUE TO LARGE GALL-STONE IN ILEUM

HISTORY

PATIENT, female, unmarried, aged fifty, enters hospital on account of pain in left lower quadrant of abdomen, continued vomiting, and weakness.

In July, 1912 (seven months ago), the patient was taken ill with severe pain in right upper quadrant of abdomen. This came on very suddenly and lasted one day. She began vomiting about one hour after onset of the pain, and the vomiting continued at intervals during the day. Vomitus was bile colored. Pain did not radiate to shoulder, and she was not jaundiced.

In October, 1912 (four months ago), she had a similar attack, with pain in the same region,—the right upper quadrant,—not definitely localized in any one place. The vomiting continued for nearly three days and was bile stained. She was not jaundiced.

At Christmas-time, 1912 (two months ago), after eating a heavy meal, she was taken ill with very severe pain in the abdomen, in the same region as in the previous attacks. This lasted for two days. No radiation of the pain. The vomiting started almost at once, and was quite severe. She was not jaundiced. Was very constipated in all these attacks, but is not sure whether there was a complete stoppage of the bowels. At no time was she ill enough to call in a doctor.

Tuesday, February 11, 1913 (ten days ago), she ate a heavy meal at noon. At 3 o'clock in the afternoon she had a severe pain over entire upper abdomen—much more severe than at any previous time. She did not go to bed, but took a walk, thinking it would help her. Between 6 and 7 o'clock in the evening she began to vomit, and the vomiting continued until the present time. Every two hours or so she becomes very nauseated and vomits bile-stained material. On Tuesday even-

ing she noticed that it had a very offensive odor. She cannot keep anything in her stomach. Has not been able to have a bowel movement since onset of trouble, neither can she expel gas. Enemas return clear. She can retain no cathartics in stomach. Abdomen seems slightly distended. The last two days the pain seemed worse in the left lumbar and iliac regions.

Patient always has been very constipated. Never any mucous or bloody discharge. Thinks she had no fever in any of the attacks. Always been unusually well and strong, except for present trouble. Has lost no weight. Has had no night-sweats and never was jaundiced.

COMMENTS AND OPERATION

DR. MURPHY: This woman had recurrent attacks of vomiting with fecal retention. She has had no bowel movements since February 11 (ten days ago); nothing came through the bowels. She is tender to pressure in the left iliac fossa. She has been having salines since her admission into the hospital. Examination by the rectum is negative. She has had regurgitant vomiting for ten days. Some gas came through and the vomiting ceased, but the emesis returned yesterday. It is not an adynamic obstruction, and it is not a strangulation obstruction. It is an obturation obstruction.

We will enter the abdomen through the left rectus muscle. She has a very large abdomen, and we have to extend our incision high up. Nothing resembling a tumor could be felt at any time; no history of bloody or mucus discharges. There is a possibility of the obstruction being caused by a carcinoma, but that is negated by the absence of blood and mucus in the stools.

Having gone through the skin, rectus muscle, fascia, and peritoneum, we are ready to make the examination. There is a dilatation of the small intestine and there is free fluid in the peritoneal cavity. It is not bloody. This dilated small intestine shows that the obstruction ought to be in the ileocecal region. There is no dilatation of the large intestine. The sigmoid is not dilated. The next thing is to palpate the transverse colon. The transverse colon is not dilated at all. That shows us that

the obstruction is in the small intestine. Now I am under the great mesentery. There is the trouble. It is a huge gall-stone in the ileum that had ulcerated through the gall-bladder into the intestine. It is a faceted gall-stone, showing that it was one of many stones.

I once had a case of fecal concretion that had been in the bowel for twenty years. The man had eaten a mass of plum-pudding when a boy, and from that time until we operated he had recurrent attacks of pain. We opened the abdomen and found a mass in the small intestine which proved to be plum-pudding covered with calcareous material.

This was a very pretty case. It is pretty because it shows the length of time the stone remained quiescent. When it began to move, she got the colic. That is in accordance with the statement we made many years ago that it is the moving body that causes the colic. That stone has been arrested in the bowel for eighteen months.

We will incise the bowel over the stone opposite the mesentery and take out the calculus, exercising great care to prevent the field from becoming infected. Two rows of Pagenstecher linen and one row of mattress stitches of catgut will close the opening. The stone is disk-shaped, about one inch in diameter, and three-quarters of an inch thick. Its upper and lower surfaces are concave.

This patient gave no history of a jaundice, which shows that this stone escaped from the gall-bladder into the intestine by ulceration through the wall of the gall-bladder into the small intestine. This must have occurred about a year and a half ago, at the time she had the initial symptoms. If it had passed through the common duct into the duodenum, she would have had a severe colic and jaundice as well, which was never a symptom at any time in the course of this case. She gives a history of having had disturbances in the right hypochondrium some years ago.

The reason we did not make an exploration of the upper abdomen at this time was that she is in the eighth day of her obturation ileus. The diagnosis of obturation ileus was made

before the operation, and it has been verified by the operative findings.

In locating that obstruction we followed a definite plan, which we have used for many years. First we expose the sigmoid, unless we see a contracted coil of small intestine in the field when the abdomen is opened. If one sees a contracted coil of small intestine, then the first point to seek is the ileocecal valve, because then we know that the obstruction is above the ileocecal valve. When the ileocecal valve is reached, the ileum is explored. If the obstruction is above that, it will show a contracted ileum. We then pass the small intestine through the fingers, keeping them all the time within the abdomen, so that nothing will be permitted to escape through the abdominal wound. When the obstruction is reached, it is removed through an opening in the bowel.

These obstructions occur much more frequently in the right iliac fossa than in the left. They occur where bands develop from the remnant of the omphalomesenteric duct attachment—that is, 39 inches above the ileocecal valve. It is the most common place for the formation of annular contractions of the intestinal wall that are dense and firm enough to produce an obstruction if the intestine passes beneath the band, but also the most common place for the formation of intraperitoneal bands, as well as the site for attachment of the remnant of the vitello-intestinal duct or Meckel's diverticulum. The bands must be elevated, and the point of their crossing carefully examined, to see that necrosis has not taken place from the strangulation at the junction of the bands. The band is then freed, and the strangulated colon brought up and its vitality determined; namely, whether it will live or not. If it is decided that it will live, then the omentum is wrapped around it and the bowel replaced in the abdomen. The omentum may be tacked to its mesentery. This is a safe thing to do in that class of cases, because when the omentum is wrapped properly around the bowel, it rapidly becomes adherent, and if necrosis does occur, perforation is prevented by the omentum. If there is only a small dark area, where the band has compressed the intestine, one-

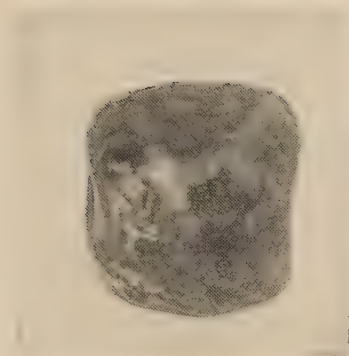


Fig. 67.—Obturation ileus. Full-size reproduction of the gallstone found in the ileum.

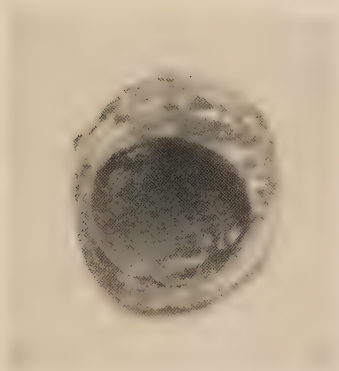


Fig. 68.—Obturation ileus. Under surface of the stone, showing one of the large and well-marked facets. There was a similar facet on the upper surface, showing that this was one of a number of stones.

fourth or one-eighth of an inch wide, this can be covered over by an annular Lembert stitch and an involuting stitch of catgut, which is often sufficient to protect that weakened field, and it does not produce intestinal obstruction subsequently. One small drain will be inserted here, and the abdomen closed in the usual manner.

The basis on which we made the diagnosis of obturation ileus was the fact that she had vomited and that repeated salines had relieved the severity of the attack; second, that this condition has been present for eight days without the patient going into collapse; third, in obturation ileus the patient may go three, five, ten, and even fifteen days without a bowel movement, and still show no effect of the fecal or general intoxication, while in strangulation ileus, when the vomiting once begins it continues to increase in severity to a fatal termination, if not relieved. Just before the fatal termination a brownish-black liquid with a distinctly fecal odor is vomited in a projectile way. The most serious of all symptoms of intestinal obstruction of the mechanic variety is the capillary cyanosis. Cyanosis occurs in the capillary circulation twelve to fifteen hours after the onset of the symptoms. The temperature is often subnormal. The pulse increases rather rapidly in frequency—out of all proportion to the increase in temperature and the leukocytosis. The leukocytosis is not common, but is sufficiently frequent that it cannot be used as a differential symptom between obstruction and infection. McDonald reported a 30,000 leukocyte count in an acute intestinal obstruction without gangrene or infection. In the obturation type some fluids probably pass by the obstruction and some of the patients expel gas, but no feces.

The obturation ileus may result from—

- (a) Neoplasm.
- (b) Cicatricial contraction of the lumen of the bowel without a strangulation of the circulation.
- (c) Volvulus of at least three-fifths of the circumference of the sigmoid.
- (d) From fixations of the bowel through adhesions from the wall of the abdomen, as occurs in postoperative ileus.
- (e) From foreign bodies—(1) Gall-stones, the most common;

(2) fecal concretions; (3) neoplasms—fibrous adenoma of the intestine.

(f) Invagination of the intestine—intussusception. In these cases the intestine is on a border-line between strangulation and obturation, from a symptomatic as well as from a clinical standpoint.

(g) When the intestine is invaginated to a severe degree, the inner pouch or the intussusceptum is strangulated by the fixation of the intussusciens at its neck, this also causing an occlusion of the mesenteric vessels and bowel lumen at the point of entrance of the intussusceptum.

Emesis is a very important symptom in making the differential diagnosis between the obturation and the strangulation type of ileus. The fecal vomiting or the general vomiting of the small intestinal content is not at all uncommon. Pure fecal vomiting we have only seen twice in our entire experience, showing that fecal vomiting as a symptom of intestinal obstruction has practically no value, but vomiting of the small intestinal content is of value in diagnosis. Repeated washings of the stomach after small intestinal content vomiting do not regularly show a continuation of the obstruction. The disappearance of the colon material and the offensive odor from the stomach in the repeated washings show, in all probability, that the obstruction has ceased, which was so beautifully illustrated in this case forty-eight hours ago.

Of the notable symptoms in connection with intestinal obstruction, the vomiting of "fecal" matter is one of the danger-signs of impending disaster; second, the capillary cyanosis; third, the elevation of the pulse; fourth, the temperature is frequently subnormal.

In the management of these cases the first and all-important point when the physician is called is to empty the stomach by repeated lavage. Have the patient transferred to a position where the intestinal obstruction can be relieved at the earliest moment. If it is the obturation type, one must be prepared to do very extensive operative work. Resections of the small intestine are easy to make, end to end, with the round button, and for this class of cases, in the hands of the experienced surgeon,

this should be the method of election. In making the resection, a sufficient portion of the colon above the point of obstruction should be resected so as to remove the cyanotic, necrotized, infiltrated band of intestine, and get into the zone of the normal intestine. The removal of two or three feet or more of the intestine is of no moment in the final result. The treatment of intestinal obstruction was considered by me in an article written some three years ago. The salient points in it are as follows:

In the specific relations of choleliths to intestinal obstruction we can well analyze the pathologic lesions on the following basis:

1. The stones that pass through the wall of the gall-bladder into some portion of the intestinal tract.
2. The stones that pass through the wall of the cystic duct into the intestinal tract.
3. The stones that pass from the common duct by ulceration through its wall into the intestinal tract.
4. Stones that pass from the gall-bladder through the cystic and common ducts into the duodenum.

The rôle of gall-stones in the intestinal tract represents the superlative degree of pathologic changes in the gall-stone cycle. The points at which the gall-stones produce obstruction in the intestinal tract can well be judged from Courvoisier's analysis of 52 cases, and we believe this represents the average position of arrest of the stones in the intestinal tract:

Duodenum.....	3
Jejunum.....	4
Upper jejunum.....	1
	8
Upper ileum.....	4
Middle ileum.....	1
Ileum.....	18
Lower ileum.....	10
	33
Ileocecal valve.....	7
Vermiform appendix.....	2
	9
Sigmoid flexure.....	2
	52

These statistics of Courvoisier are of especial value, as they show the clinical course in the cases preceding the era of frequent operations for gall-stone disease. They correspond fairly well with those of LeConte, Gibson, Lichtenstern, Moynihan, Woods, Porter, and Murphy.

The positions of obstruction are very interesting. A lady, eighty years of age, had 22 stones in a diverticulum of the duodenum, which produced all sorts of digestive disturbances. In one patient there was an obstruction of the ileum by two stones not larger than a hazelnut at the site of a malignant stricture. In two cases there were perforations of the appendix from impacted gall-stones. In two others there were large conglomerate masses of choleliths in the intestine. In a case reported by Bermond there was a mass of stones as large as two fists, and in one by Puyroyer a mass as large as one fist. Of 125 cases, 70, after various and repeated colics, emesis, peritonitis, ileus, etc., were cured spontaneously by the passage of the stones per anum. From the analysis of the cases it was impossible to tell with any degree of certainty how the majority of the stones came into the intestinal tract, as in those cured spontaneously it was not ascertained, and in many of those on which a postmortem was made it was not recorded. In 36 cases in which the report was accurately given the stones were passed into the intestine through a gall-bladder-duodenal fistula, in 25 cases a gall-bladder-ileum fistula, in one a colon fistula, in one a duodenal and colon fistula, and in seven a choledochus and duodenal fistula.

The size of the stones that can pass into the common duct by the wedge-shaped dilatation may well be estimated from an analysis of these cases: In one, where the patient died after five days of symptoms of ileus, the stone measured four inches in circumference; the choledochus had contracted down after its passage to the size of the index-finger. In another the patient died after fourteen days of icterus from a cholesterin stone impacted in the ileum. In one a herniotomy was performed for an incarcerated hernia, but without symptoms of obstruction in that zone, and it was found that there was an enormous gall-stone filling the intestinal lumen. The choledochus was as large as

the stone. In one case there was an obstruction with two large cholesterin stones at the ileocecal valve. In this case there was no evidence of perforation of the surface of the gall-bladder, but the duct was still large. Another patient who had had an arrest of half of a large gall-stone died suddenly a few days later, and it was found that the other half had become impacted in the intestinal canal, ulcerated through its wall, and caused a perforative peritonitis. The choledochus was dilated to the size of the gall-bladder. In still another instance the patient died on the seventeenth day of the ileus from diffuse suppurative peritonitis due to an ulceration of the gall-stone through the tract. In one instance a lady aged sixty-seven years suffered four days from ileus. Laparotomy was performed; two large gall-stones were removed from the small intestine, but she died in twenty-four hours from the septic peritonitis.

It will be noted in all these cases that the ileus terminated fatally a long time after the onset of the symptoms of intestinal obstruction. That is due to the fact that the patients were suffering from an *obturation ileus*; that the stones were constantly changing their position, and, therefore, did not perforate, and, further, that with obturation ileus the patient survives a much longer period of time than with strangulation ileus, notwithstanding that in both there is a complete retention of the material above the point of obturation.

The intestinal obstruction by the stone itself may be analyzed as follows: The ileus due to gall-stone which has perforated through the gall-bladder into the intestine may have no preceding jaundice, but the inflammatory symptoms which accompany such a perforation ought to suggest the diagnosis. There may have been colicky pains preceding the perforation by the stone while it was impacted in the neck of the gall-bladder, but there is no colicky pain while the stone is in the fundus of the gall-bladder itself. If an ileus develops after an attack of colic or a prolonged colicky jaundice in women of middle age, the possibility of gall-stones should be considered. If the stone perforates into the colon, it causes few, if any, symptoms, while when it perforates into the small intestine, the characteristic attacks of

ileus are produced, and these may be repeated for months or years, depending on the advancement of the stone or arrest in diverticula in the intestinal tract. It may result finally in the escape of the stone into the large intestine, its ulceration through the wall of the intestine, with perforation, peritonitis, etc. The arrests are more common a few inches above the ileocecal valve than in the valve itself, as in the former position the lumen of the small intestine is less than at the ileocecal valve.

Intestinal obstruction may be defined as a complete or partial obstruction to the onward movement of the bowel contents, which obstruction is of *mechanical* origin. *Ileus* includes the stasis of the intestinal contents from excessive muscular contraction of the wall; *dynamic*, or paralysis of the peristaltic wave from any cause; *adynamic*, or *mechanical* obstacles to the advancement of the fecal current.

Obstruction may be unassociated with strangulation, and this is the common condition in gall-stone ileus, in intestinal polyp, enterolith, etc. Strangulation ileus involves not only the suspension of transmission of the intestinal contents, but a suspension or retardation of the circulation in the bowel segment. Strangulation ileus is a much more rapidly fatal condition than obturation ileus. In a single case of gall-stones we may have the three varieties of ileus:

1. The adynamic variety, while the stone is passing through the neck of the gall-bladder, cystic duct, and common duct.
2. The dynamic variety, where a small stone produces a spasm of the intestinal wall, with all the symptoms of ileus, and where the stone is much smaller than the lumen of the intestine, as reported by Courvoisier.
3. The mechanical variety, where the stone is large enough to occlude the lumen of the bowel completely and arrest the fecal current.

The clinical history will show symptoms of preëxisting cholecystic disturbances, either colics and cholecystitis, or cholecystitis, colics, and jaundice. These may have existed for a number of years preceding the intestinal obstruction. The intestine may be obstructed through adhesions or flexions of the intestinal

tract produced by paracholecystitis. Volvulus and incarcerations may also occur as a result of gall-stones. The symptoms of the mechanical occlusion of the intestine are:

Pain, always of a colicky character. The spasm or colicky waves decrease in frequency after the first twenty-four hours. They may be reëxcited after the muscle-wall has become fatigued by long efforts at expulsion of the foreign body; by kneading or percussing the abdominal wall. The abdomen is not very sensitive to slow pressure in the early stage.

The appearance of the *vomit* when the stone is high up is of the gastric and biliary type. When lower down, it may take on the fecal color, but it rarely ever has the typical fecal odor. The vomiting increases in frequency as the hours of the attack increase, until the stone either ceases to advance, by becoming arrested in a diverticulum, or escapes to a place where the intestinal content can pass by it. The quantity of emesis is less the nearer the stone to the pylorus. The great bulk of the material is made up of the transudation into the intestinal tract above the point of obstruction. It is not due to reversed peristalsis, but to the accumulated products of secretion and alimentation above the obstructing body. With the contraction of the intestinal wall the material cannot advance downward, and must find its escape at the upper and only outlet. It, therefore, is forced back into the stomach and is ejected. In the beginning it is associated with nausea. As the case advances vomiting becomes projectile; later it may become a mere gulp, and flood over the patient's entire face. The vomit is rarely ever fecal, that is, having the distinct odor of feces.

Borborygmus (peristalsis) is of the periodic type. It usually begins some distance from the point of obstruction, increases as it reaches the point of obstruction, and terminates in a loud explosion. The explosive point indicates the zone of obstruction. The stethoscope gives very valuable information in intestinal obstruction. A dose of morphin suspends the peristaltic waves from six to eight hours, and thus destroys one of the best aids to diagnosis.

Tympany may be local or general: local, and in the upper ab-

dominal region, when the duodenum or upper jejunum is the site of obstruction; general, when the calculus is in the ileum or at the ileocecal valve. Circumscribed areas of flatness can frequently be discerned. They are due to the accumulations of fluid above the point of obstruction. Their relations to definite obstructions were outlined by von Zoege-Manteufel. Recurrent attacks of obstruction in these cases often develop great dilatation of the bowel above the obstructed zone.

Coprostasis forms the key-stone of the arch of symptoms of intestinal obstruction. In obturation ileus small quantities of feces may be passed from time to time and even a little gas. Both are misleading symptoms, and lure the physician on in the hope that the ileus is of some other than the mechanical type, until perforation or other dangerous complications occur. The possibility of erroneously interpreting these signs should be borne in mind.

With mechanical obstruction of the intestine there is practically never an *elevation of temperature* in the first forty to sixty hours. Later, when gangrene and perforation have taken place, elevation of temperature may appear. This absence of temperature elevation is very valuable in differentiating mechanic obstruction from the infective lesions within the abdominal cavity.

Leukocytosis is, as a rule, only moderately increased. We have seen, however, a 36,000 leukocyte count in a case of mechanical ileus.

Differential diagnosis will have to be made from, first, gall-stone obstruction of the neck of the gall-bladder or the cystic or common ducts; second, from acute pancreatitis, infective, hemorrhagic, and fat necrosis. This is the most difficult condition to differentiate. The elevation of temperature, however, with the great sensitiveness to pressure under the costal arch and perpendicular percussion, and the early collapse are valuable aids; third, from tabetic crises; fourth, from perforative peritonitis; fifth, from appendicitis; sixth, from acute renal lesions: (a) metastatic infarcts (hematogenous infection); (b) obstructions in the pelvis; (c) obstruction to the ureters. These acute kidney lesions give evidence of great pain on heavy fist percussion over

the diseased kidney. The presence of blood in the urine microscopically will aid in the differentiation. Seventh, embolism of the mesenteric artery or thrombosis of the portal vein gives a train of symptoms so closely resembling those of acute mechanical obstruction that preoperative differential diagnosis is rarely made; eighth, torsion of a tumor pedicle gives the pronounced symptoms of ileus, but the presence of the tumor aids one in the diagnosis; ninth, fecal impaction may be of the recurrent obturation type, and only through the recognition of the fecal mass by palpation or proctoscopy with megasigmoid or megacolon can it be differentiated.

As many of the conditions mentioned above are surgical lesions, demanding immediate surgical treatment, the importance of differentiation is not so great so far as the life of the patient is concerned. These patients should be operated on at the earliest possible moment, before there is time for perforations, perintestinal adhesions, intra-abdominal abscesses, or acute intestinal obstruction collapse, a condition from which the patient rarely ever rallies. Delay in operating for intestinal obstruction is more fatal than delay in any other abdominal lesion, except acute gastro-intestinal perforations into the free peritoneal cavity. A free gastric lavage should be given immediately before operation. Local or general anesthesia may be used—both sparingly.

The incision should be made through either the right or the left rectus muscle, over the point of greatest sensitiveness and the location of the peristaltic explosion.

When the abdomen is opened, if all the presenting coils are greatly distended, the hand should be passed into the pelvis to grasp the collapsed ileum as near the ileocecal valve as possible. This should be passed rapidly through the fingers in an upward direction, the assistant returning the coils into the peritoneal cavity as rapidly as they are palpated. When the dilated fixed point is reached, great care should be exercised not to tear the intestine where its wall is weakened by necrosis or ulceration from pressure by the calculus. If the wall is in fairly good condition, it should be divided transversely and the calculus re-

moved. The intestine should be closed by a double Lembert suture, thus turning into the lumen of the bowel the fold that was most damaged by pressure from the calculus.

In looking for points of obstruction, when the abdomen is opened there are dangers of missing the obstructions in the periduodenal subperitoneal pockets, diaphragmatic hernia, periceal pockets, and retrosigmoidal peritoneal diverticula. When the nutrition of the intestinal wall has been materially interfered with, a resection of the bowel should be made, and a considerable sized segment of the bowel removed. Many postoperative perforations have been due to the fact that too little of the infiltrated and damaged bowel above the point of obstruction was excised.

In the small intestine the end-to-end operation is the one of choice, but when the wall is damaged, side-to-side or end-to-side, by suture or oblong button, gives the best results. Immediately after the laparotomy, if the patient is materially depressed or collapsed, an intravenous injection of 1.5 to 2 pints of salt solution should be administered before he leaves the table.

Many intestinal cases die cured of the obstruction, *i. e.*, the collapse continues to a fatal termination a few hours after the operation. The exact cause of this collapse is unknown. It never occurs with patients operated on within a few hours after the onset of symptoms, not even when a large segment of the intestine is resected. Cardiac, nerve, or vasomotor stimulants, with the possible exception of intravenous injections of adrenalin, have little or no effect in these cases. Drainage is rarely ever indicated. Proctoclysis should be instituted as soon as the patient is returned to bed, and a pint and a half of normal salt solution administered every two hours for twenty-four to forty-eight hours. Six to eight ounces of solution is of little or no value, and the practice is not to be recommended. Anodynes are rarely ever indicated after operation. Heroin is the best to use when one is necessary.

The clinical history not infrequently entirely disarms one, from a diagnostic standpoint, as these large stones ulcerate through the wall of the gall-bladder into the small or large intestine, and therefore the patient may never have obstruction symp-

toms, as when the stone escapes from the gall-bladder through the cystic and common ducts. Enormous stones can pass through the common duct without producing obstruction symptoms, as the following case indicates.

One of these large stones was encountered in the common duct of a doctor from Vancouver. It was one of the largest stones I have observed. It measured $1\frac{7}{8}$ inches in length and $1\frac{1}{8}$ inches in diameter. It came into the duct without a colic, and was well on its way to the ampulla of Vater at the time it was removed. Its enormous size prevented the spasm of the duct—the colic that is usually present when small stones are passed. This case is one of the exceptions to our law that “jaundice of any considerable duration, not preceded or accompanied by a colic, is not a gall-stone jaundice.”

The absence of jaundice is an indication of the fact that the stone is not coming through the gall-bladder, the common duct, the cystic duct, or the hepatic duct.

The prognosis in this class of cases is very good.

Another fact of importance is the presence of colic and its relation to all cases of this class. In our article on “Intestinal Obstruction and Cholangic Infections,” written eighteen years ago, we said:

“Colic is the manifestation of the advancement or advancing of a foreign body in the lumen of a canal or duct. When the foreign body becomes stationary, the colic ceases, and the pain and colic may be absent for months or years. When the foreign body starts to advance from its diverticulum, either in the gall-bladder, the ureter, or in the intestine, there is a recurrence of the symptom of pain. That foreign bodies can remain embedded for years in the ureter, the common duct, the cystic duct, or the intestine is illustrated by cases too numerous to mention. I recall one which occurred in my service in the Cook County Hospital, and which is mentioned in my article on ‘Intestinal Obstruction’ in Keen’s ‘Surgery’—the case where the patient had taken a large quantity of plum-pudding when he was a boy, cited above.”

The cessation of the obstruction symptoms, in this case forty-

eight hours ago, was indicative of the arrest of the body. The recurrence of the pain and emesis showed that the stone was again progressing, although the diameter of the stone showed that it was sufficiently large to produce an obstruction of the ileum. It might, however, have lodged higher up—about 39 inches above the ileocecal valve, where it first becomes arrested, as this is the contracted portion of the intestine, and occasionally it has a diverticulum. The ileum then expands and remains expanded up to a point three inches above the ileocecal valve, where it again contracts, and this is the narrowest point in the entire small intestine. It is a law that foreign bodies produce ulceration below the ileocecal valve, rather than above it.

[The patient made an uneventful recovery. The drain was removed on the fifth day, the stitches on the twelfth day.—ED.]

INTESTINAL STASIS CAUSED BY BAND OF ADHESIONS

HISTORY

PATIENT, male, aged twenty-seven, enters hospital on account of abdominal pain and very severe constipation. He has always been subject to constipation. Present trouble dates back two years, when he noticed a sharp, severe pain in his rectum, radiating up into his pelvis. This has continued off and on till the present time. When bowels do not move for several days, the pain becomes more severe. At the present time the severe pain persists for three or four days, and then disappears for five days. With this pain comes great difficulty in securing bowel movements. Cathartics seemed to have no effect, and when given an enema, it is often retained. He does not seem to be able to expel it. Has frequent desire to defecate, but often cannot evacuate the bowel. Has had a mucous discharge during the past two years. Occasionally, during the past year, he has noticed slight traces of blood—last time was three weeks ago. At present the stools are flat and ribbon-shaped. Has lost 15 pounds in weight during the last two years. Has drenching night-sweats at irregular intervals. They last a week or ten days, and then disappear for a week or so. Has no cough. Is very nervous, and recently seems to tire very easily. The only way he can secure a bowel movement now is by an enema. Cathartics seem to have no effect.

COMMENTS AND OPERATION

DR. MURPHY: This is not a tumor of the intestine—it is an intestinal stasis. Did you say he had rectal pain?

INTERN: Yes.

DR. MURPHY: He did not tell me that. He said he suffered

from severe constipation. He has gotten along with cathartics of increasing strength, only he has reached the limit. The statement of his pain is not the one he gave to me. He has some bloody discharge, a condition that comes with the chronic constipation accompanying tuberculosis of the intestines. There is no history of fever. The slimy mucous discharges were the sequence of a chronic colitis. We did not estimate the condition as being one of intestinal tumor. From the statements read by the intern one would be suspicious of an intestinal tumor, but there is no tumor palpable. There is nothing to make me think it is a tumor; no history of tuberculosis, the only suggestive symptom being a discharge of this quantity of blood. If it is a tuberculosis, it is higher up in the abdomen than usual.

The condition of the patient is this: he is out of commission. This is one of the cases that comes under the classification made by Mr. Lane. He is out of commission because of his autointoxication and his constipation. It is not only in his bowel now—it is in his “head.”

Examination of the rectum shows absolutely nothing visible or palpable from below. We are, therefore, probably going to short circuit the large intestine and attach the ileum to the sigmoid. We will do that operation if the conditions indicate it. There is nothing in the history to indicate the presence of a colitis that would result in a pericolicitis; no dysentery. He has no evidence of an enlarged colon. He never passes large masses of feces. We did not make the high proctoscopic examination.

The results in these cases, as interpreted by Mr. Lane,—and he is the man whom we all follow in this work,—have been rather striking. He advocates the removal of the entire large intestine, which he did in a number of cases, and got a good result as far as the relief of the symptoms is concerned. More recently he has modified his position and does not resect the entire large intestine in all cases; he short circuits the large intestine, and attaches the ileum to the sigmoid, closing up the space between the meso-ileum and the mesosigmoid, so as to prevent the falling of the small intestine through the loop. If we do that operation, we will make an end-to-side union of the ileum to the sigmoid. We

will probably do that with the round button in place of the suture, but we will put the suture outside of it, just the same as we do a gastro-enterostomy. This operation should not be done without careful consideration of the patient.

This man has sought relief at many clinics. He has been advised to have a short-circuiting operation done, and finally he has arrived here for operation. Now, then, if we can find some pathologic condition other than a simple retention or stasis, we will be mighty happy. We like that better than to have to do a short-circuiting operation for a stasis. It was believed by Mr. Lane that the removal of the large intestine would be the operation of election in these cases. He has had little backing up of the feces into the large intestine from the short-circuiting operation. It seems to me that I read an article where that occurred and where a subsequent operation had to be done. I cannot recall the article at this time, but I feel quite certain it was not from Mr. Lane's pen.

Short-circuiting of the intestine for tuberculous lesions is a very old operation. We have been utilizing for twenty years now the exclusion operation of the Germans; that is, where the tuberculosis involves the caput coli, the transverse colon, a large portion of the descending colon, or any of these portions where there is an infiltration of the mesentery and where there were organic adhesions. It was used because of the fact that when you short-circuited the intestine for tuberculosis you threw the tubercular ulcer out of the fecal current, and the tendency is for it to repair. Some years ago Dr. L. L. McArthur operated on a young lady for tuberculous stenosis of the bowel. He did the short-circuiting operation. She also had a tuberculosis of the intestines, and he put her on the tuberculin treatment. He made an end-to-side union with the button, and she has been perfectly well since, not showing the slightest evidence of a continuation of the tuberculous process. This is quite in contrast with Virchow's early belief. He said he never saw a case of tuberculous ulcer of the bowel that had been fully repaired preceding the advent of tuberculin. She is almost as broad as she is long. Repair of tubercular ulcers has been reported any

number of times since tuberculin has been used. Preceding the use of tuberculin, in the Pathologic Institute at Berlin, Virchow reported that the tuberculous ulcer would not repair. Paul Guttman reports a number of cases of ulcers of the intestines in patients who died of tuberculosis of the lungs, and who had been given continuous treatment with tuberculin. As it was given them in very large doses, all the bowel ulcers were healed. That was the first time Virchow said he ever saw a healed tubercular ulcer, showing how rare repair was at that time.

I am going into this abdomen through the right rectus muscle, close to the midline. We go through the skin, fat, fascia, and rectus sheath, displacing the fibers of the rectus muscle outward, so as not to have the division of the aponeurosis on the same plane as that of the muscle-fibers. The peritoneum is then opened in the usual manner. There is the sigmoid. We draw it up into the field. There is no tumor of the sigmoid, no thickening of its walls, and no dilatation. Now we will palpate the large intestine, and as we near the liver, we find the cause of the obstruction. It is a firm band of adhesions coming from the duodenum, passing clear around the transverse colon to the back, and out on the opposite side. There is where the obstruction occurred. He has no history of a pericolicitis or pericholecystitis, and still that is where the duodenal fixation, which Mr. Lane has described, occurred. He has an extensive perisigmoiditis. That is indeed a pathologic condition.

I will cut and ligate that band. The intestine is now perfectly free. I will cover all of this raw surface with omentum. The adhesion band which exists over the sigmoid as the result of a perisigmoiditis is large and firm, about $2\frac{1}{2}$ inches broad at its base, and covered about 6 inches of the sigmoid; the sigmoid was plicated over on itself in the pelvis. A short-circuiting operation is not indicated now. We merely divide and ligate all the adhesions.

Now you can see why the enema was not returned. That band was the cause of his trouble.

We will examine his appendix. It is embedded in the wall of the caput coli. It is distinctly pathologic. It is very long,

looped, and completely embedded by adhesions. The tip is directed upward. There is considerable increase in the vascularity of the caput coli. In handling this case one cannot get away from the conviction that there were many conditions leading to this obturation condition.

Let the record show that the appendix was about $6\frac{1}{2}$ inches long. It was a continuous source of irritation, judging by the adhesions to the caput coli. It was embedded in the wall of the caput coli as the result of inflammatory adhesions.

This was a very interesting case. I am convinced that he is going to be relieved by the operation.

Let the record show that there was no shortening of the meso-ileum and no evidences of tuberculosis—no tumor; that there was no dilatation of the colon, meaning that there has been no organic and continuous obstruction, merely an obturation obstruction from these adhesions.

We close the abdomen, layer by layer, everting the cut edges of the peritoneum. Catgut is used for the peritoneal and rectus aponeurosis sutures; silkworm-gut for the figure-of-8 tension sutures, and horsehair for the skin. The usual dressing is applied.

[This patient got along very well. He had a normal bowel movement on the third day after the operation. His bowels continued to empty themselves naturally once and twice a day afterward. The patient left the hospital four weeks after the operation.—ED.]

PARATRACHEAL TUMOR—CYSTIC ADENOMA OF THYROID

HISTORY

PATIENT, male, aged forty, enters hospital on account of severe hoarseness and smothering and choking spells at night, and because of a tumor in his neck which he says is on his "wind-pipe." On the morning of December 18th (two months ago) he awoke and found himself very hoarse. He was able to speak only a word or two, and then he could not get out a tone above a whisper. The night before he had coughed a great deal, and he was awakened many times. He had had a cold for about a month previous to this time, accompanied by a mild cough and coryza. His throat was sore for one week. His voice cleared up slightly during the morning in question, but at night it became worse again, and he was unable to speak above a whisper. He had a very severe cough from the onset of the hoarseness—an irritating dry cough. He felt as though he had considerable phlegm in his throat, but he could not raise it. His cough came in spells, and would be so severe as nearly to convulse him. This condition continued for nearly ten days. He was practically unable to speak during this time. Then his cough became much worse, keeping him awake all night, and following a spell of coughing he would complain of severe pain in the left lower side of the chest and occasionally in the right side, up near the axilla. Also following the coughing he would seem to have a "lump in his throat." He felt suffocated and struggled for breath. The slightest exertion would precipitate a spell. Often he was wakened by one at night. He felt better when he was up. Lying down seemed to suffocate him. The condition remained about the same until his entrance to the hospital.

Six weeks ago he began to have nosebleed. It bled first on

one side and then on the other. The bleeding usually occurred in the morning. He still has the nosebleed. When his coughing spells became severe he had a burning sensation down in his throat. Then he vomited a green liquid. This vomiting only occurred after a severe coughing spell, however, and bore no relation to food or feeding. Seventeen days ago he noticed that he was at times passing bright-red blood from his bowels. For two weeks the stools were tinged with blood. He had no chill at the beginning of the trouble, and thinks he had no fever. Had no night-sweats. Had pleuropneumonia six years ago. No other serious illness. Has had a slight, hacking cough all his life, but no expectoration. Venereal history negative.

COMMENTS AND OPERATION

DR. MURPHY: That case is a very odd one. His symptoms came on suddenly, the first being the coughing. How much does he drink?

INTERN: He says he drinks quite a little beer, but not much whisky.

DR. MURPHY: He looks like a man who might have a typical alcoholic hoarseness—a whisky hoarseness. But this hoarseness came on suddenly; then he got better again. He had another spell, which continued for a week or ten days. Then he began to have nosebleed and hemorrhages from his bowels, and they continued for two weeks. That bleeding has stopped now, and he is here with a small mass on the side of the trachea. We had the laryngologist examine this. He says there is no involvement of the vocal cords, and that the hoarseness is due to pressure on the larynx.

The mass here was felt in the throat near the midline. It does not pulsate, therefore it is not an aneurysm. Neither is it an abscess. There is no fluctuation present. It is apparently attached to or is a part of the thyroid. It is not an enlarged thyroid in the real sense. It feels like an encapsulated mass, separate and distinct from the thyroid. There is no evidence of an enlargement in the larynx, or indication of an existing infection outside the larynx, which so frequently occurs with the tubercu-

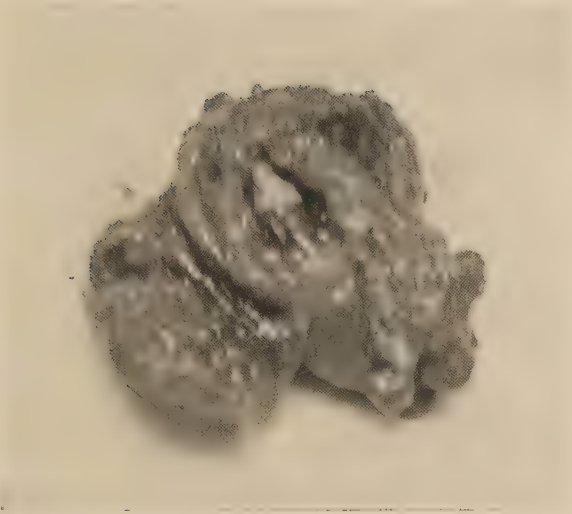


Fig. 69.—Paratracheal tumor. Cyst of the thyroid laid open, showing thick capsule and débris in cyst.

lous variety of laryngitis or the carcinomatous variety of laryngitis. He has the type of cough that would result from an acute irritation of the recurrent laryngeal nerve. Another lesion to be considered here is hematoma. Is this a hematoma that has formed in the paratracheal tissue and that is pressing on his recurrent laryngeal nerve? I have asked Dr. Tivnen to look him over, and, after a careful examination, he has come to the conclusion that the mass is outside of the trachea, and that it is pressing on the larynx, causing his cough and hoarseness.

I am going to expose this mass in the same manner that I would remove a tumor of the thyroid. A transverse collar incision will be made, extending through skin, fascia, and platysma. I am going to divide a portion of the sternocleidomastoid on this side, so as to get well around this tumor, and examine it and outline it before I do anything else. I will divide the sternohyoid group of muscles. There is no evidence here of an enlarged thymus. By retracting the sternocleidomastoid the tumor, for such it appears to be, comes into view. It is pressing on the trachea. It looks like a thyroid neoplasm. Whether it is malignant or non-malignant will have to be determined later. It does not pulsate, and it does not look like a hematoma. It feels hard and firm, but scarcely firm enough to be malignant. It is encapsulated. It apparently originated on the wall of the trachea, and compressed the recurrent laryngeal nerve, giving rise to the train of symptoms described. I can enucleate the tumor very easily. There is practically no hemorrhage.

The wound will be closed in the usual manner. The divided muscles will be reunited with catgut, and the skin with horsehair.

Tumors and cysts in this position frequently compromise respiration. Many years ago a colleague of mine had a cyst as large as a goose-egg in this position. He persisted in not having anything done for it. After an acute cold, he suddenly got an attack of asphyxia. He was in the neighborhood of the College of Physicians and Surgeons, and the late Dr. Alexander Hugh Ferguson punctured the tumor with a trocar and saved the man's life. The tumor proved to be a cyst. In another case, in 1884, I was called to see a young lady who was deeply cyanosed

and almost pulseless. She had a small tumor on the right lobe of her thyroid, which was compressed between that and the clavicle and had flattened and caused absorption of the trachea. Division of the isthmus of the thyroid permitted of elevation of the tumor out of its confined position and she was immediately relieved.

[The tumor proved to be a cystic adenoma. The patient made an uneventful recovery.—ED.]

DESMOID TUMOR OF THE RECTUS MUSCLE

HISTORY

PATIENT, female, married, aged thirty-one, enters hospital on account of tumor in right rectus muscle above umbilicus.

Patient first noticed this tumor six weeks ago, when she was having some breast trouble. She had a smarting sensation in region of tumor. On palpation she discovered a lump, quite hard and fairly movable. Six months ago, in the beginning of the last three months of her last pregnancy, she suffered a more or less constant pain in this location, as she describes it, like something pinching or pulling at her skin of the abdomen. It got worse as the pregnancy advanced, and disappeared after the baby was born. Two years ago, during the last three months of her first pregnancy, she experienced the same sensation in this region, and it too disappeared after the birth of the child, but at neither time did she discover any mass there. Has not noticed any change in size, shape, or consistency of the tumor during the past six weeks. It is never tender.

Past history is negative. Always well and strong. Menstrual history normal. Has had two pregnancies, the last completed about seven weeks ago. Mother, father, and brother died of carcinoma.

COMMENTS AND OPERATION

DR. MURPHY: This is a very rare case. I have not seen more than a half-dozen of these cases, showing what a rare type of tumor it is. I think I have seen five. This is the third to come to operation.

There is a very strong family history of carcinoma here, but the patient is a young woman. She just had her second child. During the last three months of gestation she complained of

some irritation in the upper abdomen. It continued until after confinement. When you palpate this tumor, first it appears to be in the abdomen; but when she takes a full breath, the tumor seems to be thrown outside of the abdominal wall. That is a very important sign in connection with desmoids, and to which we called attention some years ago. Ordinarily, the tumor appears to be a part of the muscle.

The term desmoid is used to apply to very hard, fibrous tumors or fibromata of the abdominal wall. It is not a pathologic term at all—it is purely a clinical term. These tumors are rather uncommon. They occur most frequently in young women between twenty and thirty-five who have borne children, although they have also been observed in the nullipara and even in men. In the greater proportion of the cases the tumor is first noticed by the patient some time during pregnancy, and they have been known to take on a very rapid growth during that time. We do not know of any reason for the association of these tumors with pregnancy.

Their usual location is in the posterior layer of the rectus sheath, above the umbilicus, more often on the right side than on the left. They have been observed less rarely in the abdominal wall, attached to the costal cartilages and the crest of the ilium. It has been supposed by some that rupture of the rectus muscle during labor may be the etiologic factor in the production of these tumors, and the fact that the muscle usually ruptures from its posterior surface would lend some color to the correctness of this belief. However, it must be remembered that these tumors grow from the sheath and not from the muscle itself, therefore rupture of the muscle would not be a direct, but merely an indirect, factor in the causation of desmoids in this locality. They are always fibromata originating in the connective tissue of the sheath, and not in the connective tissue in the muscle.

In shape the tumor is often ovoid, rarely ever being spheric, globular, or disk-shaped. The size of these tumors varies from that of a pea, weighing a fraction of an ounce, to a mass weighing many ounces. The tumor is not definitely encapsulated. It infiltrates the tissue in which it is found, so that its attachment is



Fig. 70.—Desmoid tumor split longitudinally, showing the density of the fibrous structure.

rather firm and there is an ingrowing of connective tissue into the tumor, as well as an outgrowing from the muscle into the connective tissue. The tumor may undergo calcareous infiltration or myxomatous degeneration.

Microscopically, the tumor is a pure cellular fibroma. The borders of the neoplasm are infiltrated with muscle-cells. These tumors are usually of slow growth, and, therefore, the symptoms to which they give rise vary both in number and in intensity. Usually the patient is inconvenienced only by the size of the growth, when it is large, although sometimes it is very painful, and if the mass projects into the abdominal cavity, additional symptoms may be caused by the formation of intraperitoneal adhesions. When situated below the umbilicus, they may be mistaken for pelvic tumors, and cases are on record where, the mass being situated above the umbilicus, a diagnosis of carcinoma of the stomach was made.

When these tumors are removed, there is but little tendency to recurrence, although recurrences have been reported. Opinion varies somewhat on this point. Stone, for instance, in 1908, analyzed the clinical statistics of these tumors and said at that time that recurrence was noted in 90 per cent. of the female and 68 per cent. of the male patients. Pfeiffer, on the other hand, who wrote on this subject quite extensively some time before Stone's paper appeared, estimated the recurrences in women at only 21 per cent. In the 5 cases we have seen there has been no evidence of recurrence after removal of the growth.

The treatment consists in excision of the tumor without opening the peritoneal cavity, if it can be avoided. The size of the mass will determine the extent of the operation. In large tumors it may be necessary to open the peritoneal cavity in order to make a complete excision. We always endeavor to preserve the anterior sheath of the muscle in order to prevent the occurrence of a ventral hernia.

We will make a large incision directly over the mass, incising the skin above and splitting the anterior sheath of the rectus and exposing the neoplasm. You will note that the tumor is very hard, because the scalpel grates as I cut into the mass. We

will not remove any more of the rectus muscle with the tumor than is necessary, so we will go wide of the margin,—about one-half inch,—so as to make sure that we have enucleated all the tumor-cells. We are going to do all we can to prevent a recurrence.

The tumor is about the size of my index-finger. When I palpated it before the operation through the abdominal wall it appeared to be about as large as my fist. It occupied the right rectus muscle, just to the right of the midline, and just above the umbilicus. We succeeded in enucleating it without opening the peritoneal cavity, which is rather gratifying. The anterior sheath of the muscle was not involved, so that we will be able to give this abdominal wall a firm support by suturing the anterior rectus sheath very carefully with strong catgut, imbricating the margins of the incision.

On section of this tumor you will notice the hard white tissue. It looks very much like a sarcoma, and that is one of the tumors from which desmoids must be differentiated. It is really a type of fibrous sarcoma or cellular fibroma, with a very low degree of malignancy. We do not know whether these cases ever metastasize clinically or microscopically. I will endeavor to draw together the edges of the rectus muscle, shortening it, so that this abdominal wall will have a good support.

Let the record show that this tumor involved three-fourths of the diameter of the right rectus muscle, just above the umbilicus—that is, about one inch; that we were able to separate it from the peritoneum without opening the latter; that it originated from the posterior rectus sheath, growing outward into the rectus muscle.

The abdominal wall is closed with a figure-of-8 and horsehair sutures. The patient will be advised to wear an abdominal support for a long time, so as to give these tissues every opportunity to unite firmly and solidly.

[Microscopic section of this tumor confirmed the clinical diagnosis of desmoid. The patient made an uneventful recovery from the operation. The stitches were removed on the fourteenth day, and the patient left the hospital on the twenty-second day feeling entirely well.—ED.]

PLASTIC OPERATION ON EAR

Ear Bitten Off by a Horse

HISTORY

PATIENT, male, aged forty, enters hospital on account of injury of the right ear. January 27th a horse bit off about two-thirds of the external ear. It bled profusely. The ear was bandaged. No sutures were used. Hearing is perfect. Operation February 3, 1913.

COMMENTS AND OPERATION

DR. MURPHY: The reconstruction of the ear is the most difficult plastic operation—that is, to make anything like a substitute for the ear. This ear is in very bad shape, but we are going to try to rebuild it. This man has a pyocyaneus infection on the base of the ear. He will be given a pyocyaneus vaccine right away.

We have planned to reconstruct this ear by taking one flap from in front of the ear, over the region of the zygoma, to make the top of the ear, and a second flap from behind, over the mastoid region, to rebuild the middle third of the ear. The top flap will contain a portion of the zygoma with its attachment at the ear, so as to give support to the top of the new lobe. This flap will be tongue-shaped, and it will be doubled on itself, so that a piece of the zygoma about one inch in length will be in the middle of the flap. In that way connective tissue will be approximated with connective tissue and the flap will be covered by skin above and below. The bone in it will make it stand up, and then the free edge of the flap will be sutured to its base. The denuded areas from which these skin-flaps are removed will be closed with horsehair sutures.

A large tongue-shaped flap will be removed from behind the

ear, over the mastoid region, the base of the flap being directed toward and just on the edge of the upper ear margin. This flap will also be doubled on itself in the middle, and its edges will be sutured to the flap above and to the remaining portion of the ear below. The anterior flap is about 3 inches in length and the posterior flap about $2\frac{1}{2}$ inches in length.

That will make a very good-looking ear, and without any very great degree of mutilation of the face. All the sutures will be made with horsehair, with as little tension on them as possible. One suture will be passed through the middle flap so as to approximate the anterior and posterior parts of the flap, thus permitting their union and preventing the formation of a hematoma.

The entire field of operation is then freely dusted with bismuth subiodid powder. A wire cage properly fashioned is then placed over the ear, the edges of the cage being well padded with cotton. The cage is held in place with wide adhesive strips. A roller bandage is then applied to hold in place a dry dressing put on over the cage.

[The subsequent progress of this patient was a very satisfactory one, the wound healing primarily. The stitches were removed on the seventeenth day. The pyocyaneus infection, which was dreaded at the time of the operation, yielded very quickly to the vaccine treatment. Nothing untoward happened. When the patient left the hospital, about four weeks after the operation, he had a very good-looking ear. When a second operation is performed on him for the purpose of straightening up the tip of the ear, bringing it a little closer to the head, the ear will be nearly as good-looking as its fellow. The result to the patient was a most gratifying one.—ED.]

Second operation May 12th: The drooping which remained after the primary operation was corrected by sliding the base of the new-formed ear upward on the squamous portion of the temporal bone, and bringing the zygomatic process in the flap to right angles with the skull, thus acting as a tent-pole to sustain the elevation of the ear. There was no evidence of absorption of the zygoma. This is the first time, to my knowledge, that the zygoma has been utilized for the reconstruction of the ear. It is fulfilling this purpose admirably.



Fig. 71.—Ear bitten off by a horse. Photograph taken just before operation. All the ear except the tragus and antitragus bitten off.



Fig. 72.—Lateral view. Six weeks after operation.



Fig. 73.—Anterior view. Six weeks after operation. The plastic flaps show very distinctly in this picture. There is still some swelling of the tissues.

TENOPLASTY OF FLEXOR TENDONS OF FINGERS

HISTORY

PATIENT, male, aged twenty-eight, enters hospital on account of inability to extend fingers of left hand and extreme flexion of fingers when hand is extended; also inability to supinate hand.

Present trouble dates back nineteen years. When patient was eight years old he fell from a second-story window and landed on his extended arms. Immediately afterward he had complete loss of control of both arms. He sustained a fracture of both arms, the fracture of the left arm being compound. Fractures were reduced and plaster casts applied, and both arms held in flexed position. The casts extended from fingers to shoulder, and remained on for several weeks. When they were removed, both arms were fixed in a flexed position. Forced extension was applied every day for several weeks, and the arms gradually extended. Does not remember ever having any disturbance of sensation in either hand. Patient also noticed, after removal of casts, that he could not extend fingers of left hand and he was unable to supinate right arm. Since then he has been unable to extend fingers when hand is extended, the fingers being firmly flexed; but when the hand is flexed, he is able to extend his fingers.

COMMENTS AND OPERATION

DR. MURPHY: Here is a case that is a surgical curiosity. This case also shows how misleading the skiagram can be as to the functional results. Skiagrams are being used very much in court, to the detriment of the physician, because the layman interprets the skiagram as to the functional results of a member after it has been fractured. The skiagram is no criterion as to

the usefulness of a member after an injury. I am bringing in this case to accentuate that point.

When his hand is fully flexed, he can fully extend his fingers, but the moment his hand is extended he has a most complete and forceful closure of the fingers and thumb, indicating that the flexor tendons are too short. It is impossible to extend the fingers and thumb when the hand is extended. What about the swelling of his hand?

INTERN: It began swelling immediately after the bandage was put on.

DR. MURPHY: One of the indications that a bandage is too tight is swelling of the hand. This man is not in here because of the sequence of a fracture, but because of a sequence of too tight a bandage.

Looking at the skiagram, there does not seem to be much deformity of the wrist-joint. There is a little projection behind. The external condyle of the humerus is displaced three-fourths of an inch above the normal level. He can bring the arm up. He can put the forearm through the full range of motion, showing how much a joint can be deformed and still leave a serviceable arm. That is what I want to bring out. Often you see a small deviation and no function at all. Note the great displacement and the non-union of the external condyle in this case. The same type of fracture occurred in the other arm, but with a great displacement forward of the condyle. There is a non-union also there of the external condyle.

Still both forearms can be fully flexed and extended. There is a non-union of both external condyles of the humerus. There are perfect extension and perfect flexion with that frightful looking *x-ray* result. He has pronation and supination, but his pronation and supination are not in the right place. He has a good range of motion at the elbow, but it is not a normal joint so far as the radius and external condyles are concerned. It is a false joint. He cannot extend his fingers. That means that here we do not have to deal with either of the carpal flexors. His flexor carpi ulnaris and his flexor carpi radialis are all right. They do not have to be lengthened. What we have to deal with



Fig. 74.—Tenoplasty of fingers. Side and front view, showing the contraction of the fingers at first joint, with extension at the second and third joints.

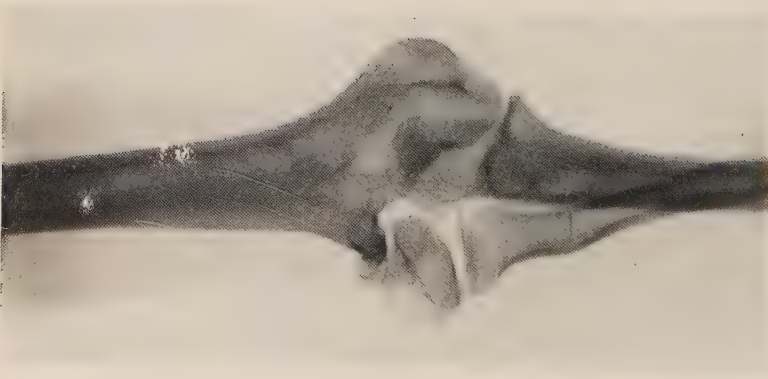


Fig. 75.—Anteroposterior view of elbow-joint, showing fracture of the external condyle, with dislocation upward of the head of the radius and separation of condyle from shaft. The radius articulates with the external condyle.



Fig. 76.—Lateral view, showing the marked dislocation forward of the external condyle. The articulation of the joint is otherwise normal.

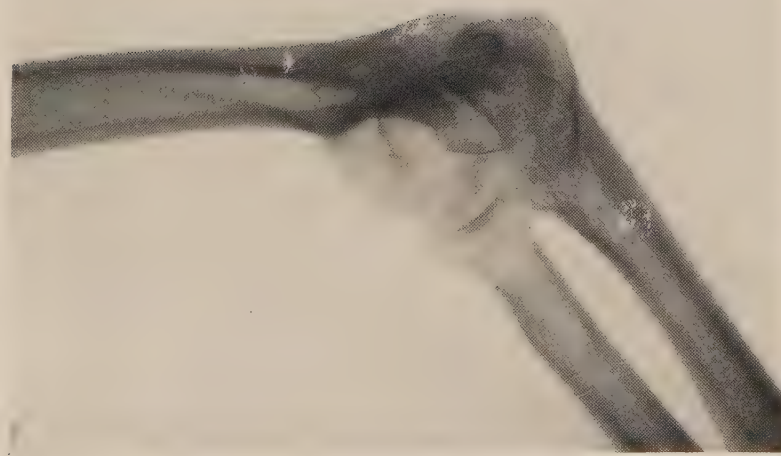


Fig. 77.—Another lateral view from the opposite side, again showing the position of the fragments and articulation of the bones, which gave patient practically normal elbow motion.

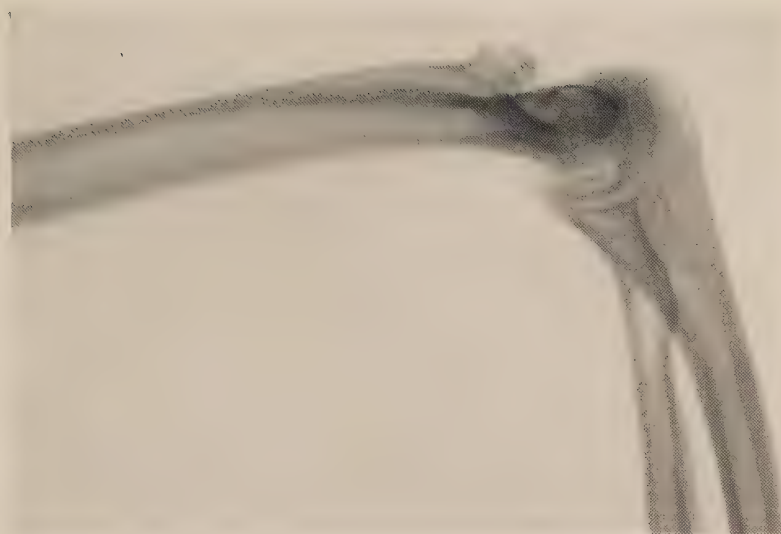


Fig. 78.—Lateral view, showing the degree of voluntary flexion in the joint. The external condyle fragment is not discernible.

is the long flexors of the fingers. There is no distinct nerve lesion.

We have had between 25 and 30 cases of Volkmann's paralysis. The muscles in his forearm feel like a bundle of violin strings, because all the muscle-cells are gone. All the mischief in these cases occurs within the first forty-eight hours. The tight bandage produces a traumatic myositis sometimes within twenty-four hours. We have seen one case where the injury was present as early as six hours after the application of the bandage. Muscular contraction from trauma of the elbow-joint is most commonly the sequence of too tight bandaging. This is particularly noticeable in the lesion described in the literature as Volkmann's contracture, Volkmann's paralysis, ischemic paralysis, and ischemic muscular atrophy with paralysis. None of these names, however, expresses the real pathologic condition, which is a traumatic myositis, the result of pressure produced by a circular bandage or splint applied too firmly against the muscles of the arm or forearm. Following such pressure there is an immediate myositis, with absorption and subsequent contraction of the muscle cicatrix. All the damage is done practically inside of the first seventy-two hours. The contraction shows itself in from four to six weeks, and assumes a fixed condition within ten to twelve weeks. It then remains stationary, except for the additional deformity which is produced by the growth of bone without a growth of muscle. This makes it appear as though the muscles were continuing to contract, which is not my view of the case.

There is no paralysis of the motor nerves from the ischemia, except when a splint presses against a nerve—the median, musculospiral, or ulnar. If one examines these patients carefully at the end of six or eight weeks, one finds that all the muscles respond to voluntary impulses; that the motion in them is limited by the fact that a greater or lesser portion of the belly of the muscle has been destroyed by the myositis, and now forms a firm cicatricial mass, often readily recognizable by a depression in the forearm or over the biceps or triceps.

When a bandage is applied too tightly around the knees, the

external popliteal nerve is readily compressed as it passes over the outer surface of the fibula, just below the head. This results not in a muscular contraction, as it does everywhere else in the body, but in a paralysis and elongation of the muscle, which in the lower extremity is recognized as a drop-foot. It is a common sequence of a prolonged Buck's extension or a plaster cast applied firmly around the knee, or of compression in splints. It results in a paralysis of all the extensor group of muscles on the anterior surface of the leg, and later a contraction of the calf muscles follows, giving the patient a talipes equinus. The drop-foot so commonly present after fractures of the leg and thigh is a dressing sequence and not an injury sequence.

Occasionally, in traumas to the arm, forearm, thigh, and leg, the muscle bellies are cut through to the bone and extensive hemorrhage into them takes place, and the muscles become adherent or united to the periosteum, which fixes and immobilizes the muscle so that voluntary contraction or extension cannot be produced below the point of muscular fixation. Absorption of the adipose tissue may follow this contraction, and the skin is frequently attached directly to the aponeurosis or belly of the muscle. A myositis ossificans, when it extends into the muscle for a considerable distance, not infrequently produces a contraction and a limitation of motion. Intermuscular and intramuscular angiomas, the result of trauma or infection, may cause a phlebitis, which in turn causes a deposit throughout the muscle or muscle group of an extremity, resulting in contraction and fixation, with permanent deformity. A bandage that has been so tightly applied following an injury as to cause a rapid edema of the extremity below the point of injury or to cause sufficient pain to require an anodyne should be removed at once. At once means *immediately*—not in a few hours or in a few days. One must bear in mind that the pressure can destroy the muscle, as demonstrated experimentally, as early as three hours following the application of the bandage, and twenty-four to forty-eight hours is ample time in which to disable a member permanently.

Bandages and splints should never be applied for the purpose

of reducing a fracture, and rarely ever for the maintenance of position by force after reduction. They are simply immobilizers or means for limiting voluntary or mechanical disturbance of the bones after reduction is effected. I have had under my care in the last three years 25 or 30 cases of this type, involving the upper extremity, which shows how common the lesion is. In not one of these was there a paralysis of sensation or motion, showing that the nerves were properly functioning. The limitation of motion was due to the contraction of the muscle following the pressure myositis.

The principles of treatment consist: (a) In the correction of the deformity; (b) in balancing the muscle groups so that subsequent contraction and deformity do not occur; (c) in the division of such portion of the joint-capsule as is necessary to permit of a full latitude of motion in the joint.

The first is accomplished by the elongation of the flexor tendons by means of a double L incision and division. The tendon should be elongated so as to leave a slack at the time of primary correction. If possible, parallel tendons should not be divided on the same line. Each tendon should have its sutures inserted at the time of division, but not tied. In the profundus sublimis pollicis group at the wrist the degree of elongation can be estimated by straightening the fingers and extending the wrist to the fullest extent after division and before approximation.

The flexor carpi radialis and ulnaris do not need to be elongated more than $\frac{1}{2}$ to $\frac{3}{4}$ inch in any of the cases, while the index and middle finger tendons may need an elongation of $2\frac{1}{2}$ to 3 inches. When the tendons have all been elongated and sutured, if the hand still does not come into a fully extended position, the capsule of the joint should be divided all along the anterior surface of the joint, and the line of division covered by a flap of tissue taken from the side of the wrist. When this cannot be accomplished, the point of union or approximation should be surrounded by egg-membrane to prevent tendon agglutination. When the sutures are tied and the tendons replaced, a portion of the tendon-sheaths or the fascia and fat from the inner or outer side of the arm should be swung in between the tendon groups and sutured,

otherwise the tendons become fixed to each other transversely and the muscles move as a group in place of individually.

The division of the joint-capsule, associated with elongation of the tendons, does not receive sufficient attention in the literature on the subject. It is necessary to secure a permanent and a good result. After prolonged contractions in the neighborhood of the elbow, when the biceps tendon has been elongated, the forearm will not come down unless the anterior capsule of the joint is divided. Then it can be forced down gently, stretching the fibers of the brachialis anticus and the nerves, arteries, and veins in the trochlear space. Occasionally this stretching of the musculospiral and median nerves in front and the ulnar nerve behind produces a complete paralysis of the muscles of the forearm. This is due to the suspension of transmission of nerve impulses in the axons by what I believe to be an edema following stretching. It disappears in from two weeks to four months. In every case under my observation the function of the muscles was completely recovered.

If the anterior or posterior group of tendons are contracted and fixed to the bone to such a degree that a plastic operation cannot be performed, then an excision of the bone should be made, the forearm or arm shortened, and the muscles and tendons placed under favorable conditions for mobility, with muscular contraction and relaxation. Fat and fascia should be interposed between the tendons and the bone. If this cannot be obtained from the neighborhood of the injury, it may be obtained from the fascia lata of the thigh. It is essential that the periosteum and the skin should not become attached to the line of the new union of muscles or tendons, as these fixations are a great impairment to motion in subsequent muscular contractions and relaxation.

We will make a longitudinal incision on the anterior surface of the wrist and expose these tendons. We must make at least $2\frac{3}{4}$ inches of an elongation of the sublime flexors. We have made more than that much of an elongation.

It is peculiar how these tendons will reunite. If you direct them toward each other, it is wonderful the enormous distance

they will span and reunite. The tendo Achillis will span the greatest distance and reunite. No other tissues in the body can be separated as much as this and reunite.

I am trying to save as much as I can of these tendon-sheaths. He has still his lumbricales and his interossei intact, both of which are short muscles and both of which act as flexors and extensors. I want to divide these tendons into two groups, so that these tendons will not become adherent in the same group. We do not have to disturb the carpal flexors. Each tendon is placed in a compartment by itself. The more compartments you can make of these tendons now, the less likely you are to have trouble subsequently from lateral adhesions. We keep these tendons from uniting to the skin at the line of union of the tendon by putting in subcuticular sutures of catgut.

The hand and fingers are in an extended position. There is no tension on the nerves at all. The skin is closed with horse-hair. An anterior splint will be put on, leaving the tips of the fingers exposed. The patient will be encouraged to move his fingers slightly after two weeks, increasing motion gradually. In five or six weeks, after the tendons have united, active motion of the fingers will be required to prevent the occurrence of adhesions of the tendons.

[This patient left the hospital five weeks after the operation with the wound healed. He had good use of his fingers. He returned for examination on several occasions later. When seen last, normal motion in his fingers was almost restored.—ED.]

ANKYLOSIS OF THE JAW

INTERPOSITION OF MUCOUS MEMBRANE FLAPS TAKEN FROM PALATE AND FLOOR OF MOUTH

HISTORY

PATIENT, a male, aged twenty-eight, enters hospital on account of inability to open mouth.

In July, 1909, he had an abscessed molar tooth in the right upper jaw, which was quite painful and which became swollen. He did nothing for three weeks; then the doctor opened the abscess from within the mouth and cauterized it. A week later the whole right side of his face was very much swollen. An external incision was then made to reach the abscess, but they did not seem to get much pus. Four days after this operation he noticed that there seemed to be some obstruction, other than that caused by the pain, which prevented him from keeping his jaws separated. This condition has been getting steadily worse. In December, 1912, he was scarcely able to open his mouth at all; something seemed to be holding his jaws together. He says the mandibular articulations were never sore or swollen. He had no distinct chill at any time. About one year after the onset of the trouble (August, 1910) he had an operation performed within his mouth to relieve the ankylosis, but it proved a failure.

COMMENTS AND OPERATION

DR. MURPHY: This man has a complete fixation of his lower jaw. He is unable to open his mouth, and on attempting to pry it open it is seen that his jaw is thoroughly ankylosed and that there is absolutely no motion.

In considering the ankyloses of the jaw we must remember that there are three types of ankylosis in this locality. There is, first, the fibrous type, which involves the joint itself, the articu-

lar surface being held in a fixed position by the formation of fibrous tissue; second, there is the bony type of ankylosis in which there is an ossific union between the head of the mandible and the glenoid fossa of the temporal bone. The articular cartilage has disappeared, and new formed bone has taken its place, and the mandible is solidly united to the temporal bone, and sometimes to the zygoma by the new-formed bone; third, there is the type of ankylosis the result of cicatricial fixation outside of the joint, such as may follow a large ulcer of the cheek, as is sometimes seen in typhoid or scarlet fever, following an abscessed tooth, or in an infection of any kind that is followed by the formation of a cicatrix, noma, etc. This type of fixation locks the jaw. When the fixation is relieved, the jaw drops.

It is evident that these varieties of ankylosis call for different modes of treatment. The bony type must be dealt with by an arthroplasty; that is, the bones must be separated at the line of union, and reunion is prevented by the interposition of a soft tissue flap made from the temporal fascia, as was done in this clinic recently. (See case of Ankylosis of Jaw in December, 1912, CLINICS.) In the intra-articular fibrous ankylosis the same treatment is called for, because the mere division of the fibrous tissue, while it would cure the ankylosis for the time being, would not result in a permanent cure; therefore the interposition flap is demanded in this type of ankylosis, just the same as in the bony type. The fibrous tissue would redevelop, and in a greater degree than before. The fixation type of ankylosis is relieved more easily. Sometimes the mere division of the muscular attachments to the jaw relieves the fixation; that is, the attachment of the tempora muscle to the mandible may be divided; likewise the attachment of the pterygoid and masseter muscle, and in the case mentioned above the patient had such an operation performed on one side of the jaw, a typical arthroplasty having been done on the other side.

In the case before us today the ankylosis is of the extreme articular fibrous type. Cicatricial tissue is holding his jaw fixed. Our plan of procedure will depend entirely on the condition present; that is, how much cicatricial tissue there is and how much



Fig. 79.—Ankylosis of jaw. Patient was unable to separate teeth farther than is shown in the picture—hardly an eighth of an inch.

mucous membrane is available for interposition between the ends of the divided cicatricial mass when we have separated the jaws. If it is possible, we propose to take our interposing flaps from the cheek; if not, we will resort to a new method, which we tried in a previous case, taking the mucous membrane covering the palate and the floor of the mouth.

On introducing my finger into this man's mouth, I find that there is an absolute fixation of his jaw. I cannot move it even a hundredth part of an inch. I can feel a solid fibrous band extending from the upper to the lower jaw, on the outer side, which easily accounts for the absolute fixation present. In order to give us more room it will be necessary to extract the only remaining molar tooth this man has in his upper jaw on this side. The cicatricial tissue I find extends clear back to the ramus of the jaw. The anesthetic in this case will be continued through the nose, and the mouth will be held open with a mouth-gag. I will separate the adhesions very carefully with the scalpel and scissors, using my finger as a guide. We will place a small gauze sponge in the back of the patient's mouth, so that the blood will not flow down into his trachea. We always have the tracheotomy tube ready in this class of cases. Sister and I had one experience with a blood-clot going down into the trachea to the bifurcation. We felt that we were going to have a death on the table. I immediately did a tracheotomy and tried to get out the clot. I failed in that attempt. Then I inserted a soft-rubber catheter with its end cut off into the trachea and sucked the clot out, much to our relief. The patient came out of it very nicely. That is one of the experiences that certainly teaches one a lesson.

We will try to wedge open this mouth as we go along with the division of the fibrous tissue. These cicatrices are very firm, and by prying the mouth open, the adhesions are put on tension, so that we can divide them very easily without endangering the other tissues. We have now succeeded in getting this mouth wide open. It took a long time and a lot of hard work, but we accomplished what we were after without an accident. In order to prevent the recurrence of the ankylosis by the reformation of

the fibrous tissue I will interpose two flaps—one from the floor of the mouth and the other from the hard palate. By drawing the tongue over to the opposite side these areas are exposed freely; however, it will not be difficult to remove the flaps. Both flaps will be tongue-shaped, the lower one about two inches in length and one-half inch in width. The upper flap will be of about the same length but one inch in width. The base of the flap is directed toward the alveolar process in the case of the upper flap, and toward the root of the tongue in the case of the lower flap. Both these flaps will be swung outward to cover over the raw surface where the adhesions were divided. The tips of the flaps are sutured to the inner margin of the gum and the cheek. The denuded areas left after the removal of the flaps will heal over in a very short time. By using these mucous membrane flaps in the manner described the procedure in these cases is very greatly simplified, and it is not necessary to resort to the free fascia flap transplant.

It is absolutely necessary to keep these raw surfaces from growing together again. If we do not interpose flaps, this work will have been done for nothing. There really has not been a very great deal of hemorrhage. What there was was easily stopped by pressure. These tissues are so extremely vascular that they have a greater resistance against infection and necrosis than any other tissue in the body.

In a case I had some years ago I transplanted a large skin-flap from the neck, bringing it in from behind. We got only a fair opening of the mouth. The teeth had all been destroyed in that case. The procedure was much more difficult to carry out than this one, and the final result was not nearly so satisfactory.

All the suturing in this case has been done with fine catgut. On account of the denudation here we have had to use two large-sized flaps. We have tried to put no tension on that, and, judging by the result obtained in a similar case operated on a few months ago, we are sanguine as to the outcome in this case. The one referred to was a little girl who had a fibrous ankylosis causing an absolute fixation of the jaw and inability to open the mouth. We interposed a mucous membrane flap, using only the upper or

palatal flap. The result was a splendid one. When she left the hospital after five or six weeks she was able to open her mouth about one inch without any very great effort. We will pack this side of the mouth with nosophen gauze. That will not permit the jaws to come together. There are no raw surfaces to adhere and form cicatrices.

SUBCORACOID DISLOCATION OF THE HUMERUS WITH SEPARATION OF TUBEROSITY

HISTORY

PATIENT, male, aged thirty-three, comes to hospital on account of pain in left shoulder and inability to move arm at shoulder.

Present trouble dates back about two months, when the patient was thrown from a horse. The girth broke, and he fell, striking on his left arm, which was in the flexed position at the time. On rising he attempted to use his left arm, but experienced great pain in the shoulder, and extending down the arm. The pain in the shoulder increased in severity, and the patient was unable to raise the arm or to put his hand on the opposite shoulder. He could rotate the arm. The shoulder was manipulated under anesthesia and bandaged with arm against the chest. Pain in the shoulder continued, and extended to the elbow and to the extensor surfaces of the little and ring fingers. A second attempt at reduction was made and failed. The pain and the inability to use shoulder still continued.

COMMENTS AND OPERATION

DR. MURPHY: How many efforts at reduction have been made?

INTERN: Two before he came here.

DR. MURPHY: We tried it a week ago, but failed. We were afraid of fracturing the arm. The artery was pulsating when we completed our efforts at reduction. We always make a note of that. One should always do that after attempting a forceful reduction of the shoulder. The artery should pulsate. If one has a record of the pulsation of the arteries and the arm becomes

gangrenous later, it will be due to a traumatic endarteritis over which we have no control, and therefore the courts could not hold the surgeon responsible.

We believe that hematomata around the joint form in a large percentage of these cases later. That does not matter, however. It is the sudden ischemia from sudden arterial occlusion that causes the necrosis. That is beautifully illustrated in a number of specimens in the British Museum, which show the thoracic artery completely occluded in cases of Pott's disease by the abscess compressing the artery. These patients were never aware that the thoracic aorta had been completely occluded. The compensatory or anastomotic circulation rose to the occasion magnificently. That condition was illustrated very nicely in our experimental work on dogs. If we could keep up the circulation for four or five days, so that the occlusion occurred gradually, the tissues were not destroyed. That was Neff's plan. Neff worked out a method to produce a gradual occlusion of the vessels. He uses two flat pieces of metal bound together by a rubber band. On one end is a roll of chromicized catgut. As this is slowly absorbed, the rubber gradually compresses the plates and thus occludes the artery. In the mean time the collateral circulation has been developed and gangrene does not occur. This is based on the observation that a gradual occlusion permits a collateral circulation to form.

Dislocation of the shoulder occurs more frequently than of all the other joints in the body together. This is usually explained by the exposed position of the shoulder, its unusually wide range of movement, the range of leverage afforded by the humerus, and the anatomic construction of the joint, the comparatively large head of the humerus fitting imperfectly in the small and shallow glenoid cavity, and the ligaments being rather lax and thin. The capsule of the joint is strengthened above and behind by the tendons of the supraspinatus and infraspinatus and the teres minor muscles. The weakest part is below and in front, between the tendons of the subscapularis and teres major muscles. Therefore dislocations of the head of the bone occur most frequently in this position downward and forward.

The force of the blow is usually transmitted from the hand or the elbow with the arm abducted and the muscles relaxed. The head of the humerus is thus forced against the weakest part of the capsule; the capsule is ruptured, and the bone passes out through the rent into the subglenoid space.

There are several varieties of dislocations, according to the final resting position of the head of the humerus. The simplest is the subglenoid variety, in which the head of the humerus rests on the long head of the triceps muscle, just below the glenoid cavity. However, because the sharp head of the scapula and the round end of the humerus are not an anatomic fit by any means, this position is not long maintained. The bone continues in its course, depending on the nature and direction of the transmitting force and the position of the arm at the time of the injury, as well as the action of the muscles. As a rule, the bone passes forward and inward, so that it comes to rest on the anterior surface of the neck of the scapula, under the tendons of the biceps and coracobrachialis muscles. This is a subcoracoid dislocation.

Sometimes the bone continues in its course until it comes to lie under the pectoralis minor muscle against the edge of the clavicle—the so-called subclavicular dislocation. Sometimes, although not frequently, the head may pass backward instead of forward, and come to rest against the spine on the posterior surface of the scapula, under the infraspinatus muscle. This is known as the subacromial or subspinous type of dislocation. These dislocations or displacements may be attended with a fracture, and this may be a very serious complication, especially when it is the neck of the bone that is fractured, because then reduction is impossible without an open operation.

The subcoracoid dislocation usually results from a hyperabduction of the arm, with the scapula fixed, as in a fall on the inner side of the elbow. The surgical neck of the humerus bears on the under surface of the acromion, which forms the fulcrum, and the head of the bone is pressed against the inner and lower part of the capsule. Sometimes muscular action alone will produce this dislocation. A force applied directly to the upper end of

the humerus will act similarly. The head of the bone passes through the rent made in the capsule in its lower part, and thus passes inward under cover of the biceps and the coracobrachialis till it comes to rest against the injured surface of the neck of the scapula, just below the coracoid process.

The guiding principle in reductions of all dislocations is to make the head of the bone retrace the course it took in leaving its socket. The obstacles to reduction are muscular contraction, the entanglement of the head with tendons, ligaments, or bony points. A general anesthetic is an invaluable aid to reduction, although the reduction may often be effected, especially in children, by simply gaining the confidence of the patient and keeping his mind off the dislocation, so that the muscles are relaxed. The limb may be manipulated without any additional muscular force being exercised by the patient. However, it must be remembered that too much manipulation should not be attempted in any case because of the frequency with which serious damage may be done to vessels, nerves, ligaments, and even the ends of the bones. In certain muscular subjects and in nervous patients, or when the dislocation is not a very recent one, an anesthetic should always be given. In quite recent cases, where the muscles are relaxed because of the shock or temporary faintness of the patient, reduction may be attempted without anesthesia and often is successful.

The plans of reduction used in dislocations of the shoulder are so well known that we will not attempt to discuss them at this time, but will give our attention more to the case at hand. There is no fracture of the head or neck of the bone in this case. The subcoracoid ligament has torn off a small fragment of the bone,—the tuberosity,—as is shown very distinctly in the skiagram. The dislocation in this case is of the subcoracoid type, but because of its comparatively long standing—two months—all efforts at reduction, even under complete anesthesia, have failed; therefore we shall resort to the open operation, exposing the joint through an anterior incision extending from the coracoid process downward and outward on the anterior aspect of the arm for a distance of 5 or 6 inches. Since our last attempt at reduction

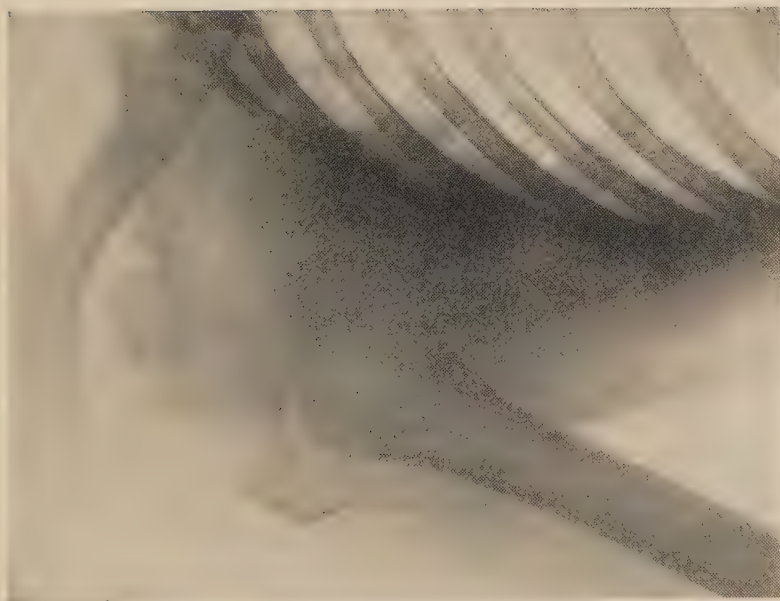


Fig. 80.—Dislocation of shoulder. Subcoracoid dislocation of the shoulder with a small fragment of the shaft torn off by the forcible contraction of the muscle. The fragment is discernible to the left of the humerus.

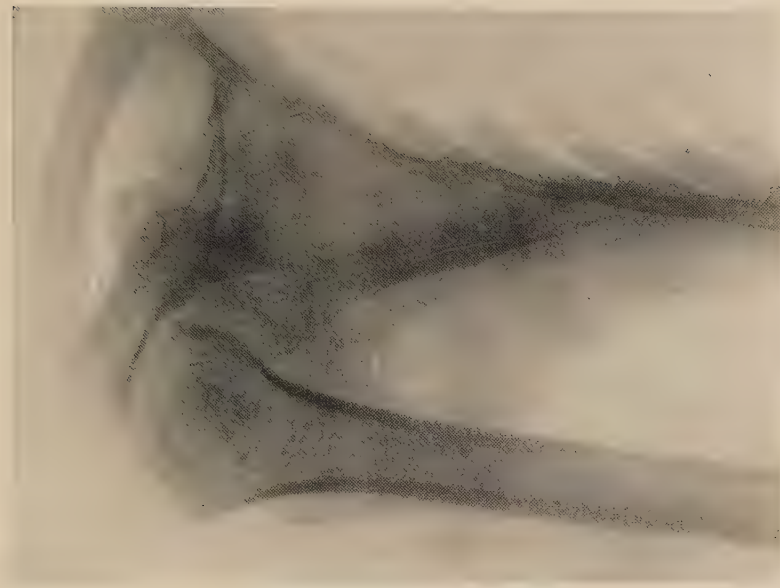


Fig. 81.—Shoulder replaced in position. Compare with Fig. 80.

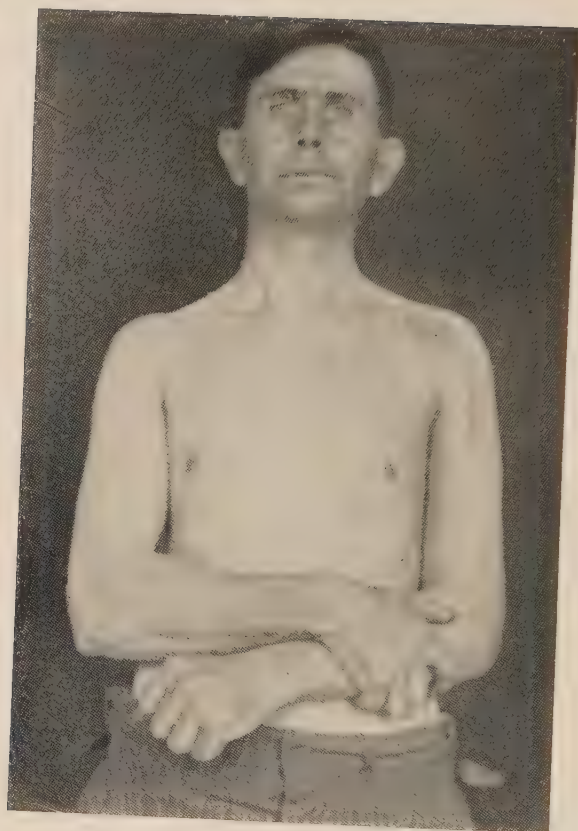


Fig. 82.—Normal contour of shoulder restored. The incision through which the operation was done shows very distinctly.

we have continued the extension on this arm so as to prevent a contraction of the muscles and to fix them in this position. As far as the muscular structures are concerned, we would like to expose this joint from behind. The operation certainly would be a much simpler one, and there is then practically no danger of injuring the vessels or nerves.

Looking at this arm, it would seem that the head of the bone is separated from the shaft, but that belief is not confirmed by palpation nor by the skiagram, and the head moves with the shaft of the bone. The dislocation is not a very bad one, because the head of the bone is not more than an inch away from its normal resting-place, but because of the length of time which has elapsed since the occurrence of this injury it has become fixed in its new position, and, therefore, it must be separated by an open operation.

I am making the incision between the pectoralis major and the deltoid muscles. I can feel the fragment of bone which was torn off from the humerus when the coracobrachialis ligament gave way. I can feel the shaft, the acromion process, the coracoid process, and the head of the bone. A fairly firm organic union has formed between the fibrous tissues, but the head of the bone is free.

We will first expose the glenoid cavity, which we find to be perfectly smooth and normal in outline. Next we will expose the head, and I find that in order to effect reduction in this case without injuring the surrounding structures I shall have to take off the coracoid process to which is attached the long head of the biceps and the coracobrachialis. I am dividing the coracoid process with the Gigli saw, leaving the muscles and ligaments attached to the fragment removed. It will be replaced before the completion of the operation. After this is accomplished the upper end of the humerus is clearly in view and easily controlled. So far as I know, this is a means not resorted to previously. I did not believe that I could slide the head back into the glenoid cavity without dividing the coracoid process and the long head of the biceps. The anatomic structures in and around this

joint are well preserved, and we have no difficulty in recognizing them as they come into view.

The next step is the reposition of the head of the humerus in the glenoid cavity. By making extension with the arm in supperlative adduction the head is pulled downward. Next, by rotating the arm outward and slowly abducting it until it is in extreme abduction, then rotating it inward again, we find that, with the assistance of two bone elevators used as levers, reposition is effected, although several attempts had to be made before this could be done.

You see it was rather difficult to restore the normal anatomic relationships in this case, even with the open operation, and no matter how long or how earnestly we had persevered in attempting reduction by manipulation, we never could have succeeded. This really was a splendid case for the open method, and I am glad to say that our efforts were entirely successful.

The coracoid process will be nailed in place with a six-penny nail. A small gutta-percha drain will be put into the bottom of this wound, to remain for seventy-two hours. The head rests easily in the glenoid cavity, and the arm movements are unrestricted. At no time during the operation were the vessels or nerves in the vicinity in any way endangered. The patient's pulse in the left wrist is beating normally. The skin incision will be closed with horsehair. The wound will be dressed with moist 5 per cent. phenol gauze. The arm will be dressed with a bandage only. It will be placed against the body with the forearm flexed at an acute angle to the upper arm, the hand placed flat on the chest, and fingers pointing toward the right shoulder.

[The patient had no pain after the operation at any time. The stitches were removed from the incision on the seventeenth day, and the drain was taken out in three days. The wound healed promptly. The patient was encouraged to perform passive motion in the shoulder. When he left the hospital, six weeks after the operation, he had good use of his arm, and, as he said, it was getting better every day.—ED.]

FRACTURE OF NECK OF FEMUR: DISPLACEMENT OF HEAD ON DORSUM OF ILIUM

HISTORY

PATIENT, male, married, age fifty-one, enters hospital on account of limited motion, weakness, and shortening of left leg. November 18, 1912,—three months ago,—the automobile in which he was riding ran off the road, turned turtle, and rolled down a 70-foot bank. He was thrown out, but does not know how he landed or how he was hurt. He could not move his left leg. It was partly flexed, the long axis of the thigh being directed inward toward the opposite leg. He was taken to a hospital at once. After twenty-four hours he was given an anesthetic and an attempt made to reduce his hip, which they told him was dislocated. An extension of 8 pounds was put on and kept on for seventy days. He had considerable pain at first, but it gradually subsided. After the effort at reduction, the leg could rest flat on the bed in the extended position. One week after the extension was taken off he began to walk on crutches. He has not put any weight on the leg to the present time. Motion in all directions is limited. He seems to have no power to lift the leg, although he can rotate it fairly well. Has been gradually improving. Had no motion in knee at first, but now he has fairly good motion in it. Has very little pain in either hip or knee. Claims legs were same length when extension was put on, but left leg is one inch shorter than the right now. History is negative otherwise.

General health always good—never any sickness. Examination of the skiagram shows a fracture of the neck of the femur, with the dislocated head resting on the dorsum of the ilium, just behind the acetabulum. It has a spicule of bone projecting from it. There is a shadow in the acetabulum, as though cast

by a fragment of bone—probably a piece broken off from the head or a deposit of bone. The shaft is displaced upward about an inch or an inch and a half.

COMMENTS AND OPERATION

DR. MURPHY: Nearly three and one-half months have elapsed since the injury. He had an extension on for seventy days, or until just recently, which prevented the shortening. It is very important to keep up the extension if you are going to make any attempt at reduction. When these muscles that are attached to the femur are allowed to contract and become fixed, it is difficult to make a secondary elongation. That is a very serious obstacle in making the bloody or unbloody reduction of congenitally dislocated hips in children—that after the age of six or eight the muscle contraction is very great. That is one of the factors that we will have to overcome in this case. If the head is entirely separated from the shaft and free, we can easily put it back in the acetabulum. That will be an easy proposition. The head may have united with the neck, notwithstanding that the skiagram shows it to be free, because in the early months of bone regeneration the *x*-rays are not obstructed by the newly formed bone. They go through, and it looks as though the fragments were not united, when in reality they are united. It would be hard to make the reduction with the head united to the shaft unless we refractured the neck. In the case of the shoulder we have no trouble with that factor. We separate the misplaced head from the shaft, take it out on the table, shape it, and put it back in its proper place. We believe that in the hip regeneration should take place just the same as it does in the shoulder, but we have not had sufficient clinical results to demonstrate this to a certainty. We have had only one case of that kind so far. (See February, 1913, CLINICS.) One case establishes a principle, but you must have more than one successful case positively to establish a practical fact. We also had a successful transplantation of the trochanter major on to the neck of the femur following fracture where the head had been absorbed. (See February CLINICS.)



Fig. 83.—Fracture of the anatomic neck of the femur close to the head. No absorption of bone, but head of bone is rotated and displaced upward out of the acetabulum, resting on the dorsum of the ilium, just above the upper rim of the acetabulum.



Fig. 84.—Two weeks after operation. Fragments in good apposition and the head of the bone in the acetabulum. Two large nails secure the approximation of the fragments. The small nail passes through the trochanter. Phosphor-bronze wire sutures are visible in the soft parts around the trochanter.

We are going to proceed on the same plan in this case as we would if we were going to do an arthroplasty. Looking over the anatomy of the hip, the one fact that impresses itself on you is that there are no muscular attachments to speak of on the anterior surface of the neck. They are all on the trochanter of the femur. The muscles all come from behind and above. Coming from in front are the muscles of the adductor group, the adductor longus, magnus, and brevis, and the gracilis. These muscles adduct the thigh. They are very powerful, and often contracted in these cases. If you flex the thigh, you can take off some of the tension on these muscles. The next group of muscles to be considered is the psoas and iliacus muscles. They are attached to the lesser trochanter from behind, and they react to extension and rotation. They flex the thigh on the pelvis. The one muscle that has no relaxation is the gluteus maximus. It extends the thigh. The gluteus maximus we do not need to detach. The obturator externus and internus, the gluteus medius, pyriformis, and gemelli muscles are attached to the tip and side of the great trochanter. We are going to take off the great trochanter, with its muscular attachments, so as to be able to locate what is left of the neck of the bone and to inspect the acetabulum. By dividing the trochanter with a chain-saw and retracting it upward the hip-joint is freely exposed and accessible. The acetabulum in this case should be perfectly free, because it is only three months since the injury, although the skiagram leads us to believe that the acetabulum is not free. If the head is entirely separated from its normal attachments, it takes on all the characteristics of a bone transplant, and osteogenesis will proceed from the neck into the head, and a new head will be formed, as occurred in one of our cases. If it is a fracture at or near the epiphyseal line absorption of the bone will take place, and go on centrifugally for a long time unless union is established. If the fracture is near the trochanter, away from the epiphyseal line, absorption will not take place centripetally. Of course, friction also plays a rôle in the absorption.

I remember a patient from New York who had a compound fracture of the neck of the femur which four doctors saw. Three

said it was not fractured and one said it was. It was an impacted fracture of the femoral neck. The man was permitted to go about, and at the end of three months the leg was materially shortened; at the end of two years and four months—the time I saw him—he had no femoral neck at all, and only a button of a head in the acetabulum. This was an interesting case, and shows how the absorption takes place from within outward. (See February, 1913, CLINICS.) The vessels go in from the neck to the base of the head, and turn around and come back in the bone. When the neck breaks just at a line one-half inch outside of the epiphyseal line, absorption takes place. It is the result of defective circulation. Whether that is the correct solution remains to be ascertained. We believe it is correct.

We had another case of fracture of the femoral neck at the base of the trochanter a year and three months before the operation, and there was no absorption at all. That man was here thirteen or fourteen weeks, and made a good recovery. These two cases are very valuable and forceful clinical lessons. Both of them occurred about the same time, and both came into the hospital about the same time after the accident. They are contrast cases.

This patient is fifty-one years of age. He has always been a very active man and a man of good habits. If the head is completely detached, I may have to take it out and put the neck of the bone into the acetabulum, using it as the support for his leg. Generally, motion is limited in such a case at the beginning, but there is gradually developed more and more motion and the final result is fairly satisfactory. The other alternative is freshening the bone surfaces, replacing the head in the acetabulum, and nailing it to the neck.

We have had very nice results in our osteoplastic work so far. We are going a little farther in each case, as we feel we should. We have four cases of fractured femoral necks in the hospital at the present time. We do the operation in a very simple way. We make a skin incision, beginning above and in front of the trochanter, parallel to the fibers of the gluteus medius anteriorly, and incircle the trochanter, making a U-shaped skin, fat, and

fascia flap. The muscles are not cut, except sometimes a few of the anterior fibers of the gluteus medius. Expose the neck fragment, get it in the proper relationship with the head, and fix it with one or two ordinary wire nails. This does not require much manipulation. We cannot do that in this case, however, because the head of the bone is luxated out of the acetabulum.

The period of time these patients are kept in bed after the operation is usually from fourteen to sixteen weeks. They are put in a travois splint, with both legs abducted and in the superlative degree of extension. Early cases of fracture of the neck of the femur are treated by abduction and extension. Remember, that you cannot abduct one limb only, because when you abduct only one limb, the patient moves his body over to the other side, throwing his body in a straight line with the broken hip, thus abducting the well leg. That is why the travois splint fits so nicely in these cases. Both legs are abducted and remain so.

The head of the femur in this case appears to be behind the neck. I am now making the U-shaped incision, as described above, and retracting this skin and fascia flap upward; the trochanter is in view. I am endeavoring to pass the chain saw under the muscles attached to the trochanter. The trochanter will now be sawed off and, with its attached muscles undisturbed, it is retracted upward. There is the head of the femur. It is entirely detached from the femur, out of the acetabulum, and resting on the dorsum of the ilium. I am detaching the Y or iliofemoral ligament, cutting down to the neck. Next I will split the capsule so I can expose the neck. It was attached to the highest roof of the neck. The top of the neck is in plain view, but the acetabulum is not in view at all. It appears as though there might be a part of the tip of the head left in that acetabulum. I am looking for the fractured surface of the neck. It ought to be in the acetabulum. I do not want to do anything here until I get this acetabulum cleaned out. The tissue in the acetabulum feels like cartilage and looks like cartilage. It is in all probability a portion of the articular surface of the head.

Now I am going to see if I can put that neck into the acetabu-

lum so as to give support to the leg in case we cannot make use of the head. There is the head, on the dorsum of the ilium, with connective tissue between it and the neck. The tissues are partially united to the side of the fractured acetabulum. The head ought to come right out, but it does not, because of this new-formed fibrous tissue. With careful scissors dissection we free the head from its bed, grasp it with heavy bone forceps, and remove it entirely from the body. A portion of its articular surface is missing. That is the piece of bone and cartilage in the acetabulum. The capsule which is attached to the margin of the acetabulum will be turned in to fill up that acetabulum. That will effectively prevent an ankylosis from occurring later.

The piece of bone in the acetabulum will have to come out before the head can be replaced. That grew in much firmer than I believed it would in three and one-half months. That should not have grown in so solidly in that period, but it has.

Now the acetabulum is cleaned out, and the capsule fragments are turned into it. The fractured surfaces of the head and neck will be squared off with bone-cutting forceps, so that we will have two good apposing surfaces. By adducting the leg and turning or rotating the knee outward the neck is easily thrown out into the field of operation. Now we will replace the head in the acetabulum. This is only the second time we have done this. By extending the leg slowly, abducting it, and rotating the knee inward, we secure a good approximation of the head and neck. Two wire nails are then driven through the neck into the head from the shaft side, and the operation is completed. I did not overestimate the difficulty in this case. The trochanter is replaced, and a small wire nail is driven through it into the shaft.

The reconstruction is not nearly so severe as one would expect it to be. The deeper layers of the wound are closed with phosphor-bronze wire. Horsehair is used to close the skin incision.

Let the record show that, after exposing the trochanter, the head was found resting on the dorsum of the ilium, posterior to the acetabulum; that it was permitted to remain until we had

cleared out the acetabulum. On examination of the acetabulum it was found that a portion of the head had been fractured off and remained in the acetabulum. This was excavated. The head was then freed from its position, taken out on the table, including a portion of a fragment of the neck attached to it, was squared off so as to get a broad surface to rest against the freshened neck. A point of the neck was also leveled down to adjust itself to the head. It was a little difficult to replace the head in the acetabulum, but finally it went in in good position, and there was an accurate approximation of the head to the neck, as is shown in the skiagram (Fig. 84). The fragments were held in apposition by two twelve-penny wire nails driven in from the shaft. The trochanter was replaced and secured in position with a small wire nail. We then sutured the fibrous structures with phosphor-bronze sutures. There were no ligatures used in the entire operation; the oozing had practically ceased before we were ready to close the wound. The whole operation involved a considerable dissection. Both legs will be placed in a travois splint in supreme abduction without extension.

VISITING DOCTOR: How long before you will dress that wound?

DR. MURPHY: If all goes well, in about three weeks. The purpose of the moist 5 per cent. phenol gauze which we always use in this class of cases is to take up the secretions from the wound and keep them sterile. It prevents the growth of the saprophytes. When you remove this gauze in three weeks there is absolutely no odor. I remember seeing Lister taking off this old-fashioned 5 per cent. phenol gauze and asking his audience to smell it. It showed that he was right in his theory. The danger of infection is not so great in this as in the earlier cases. If all goes well, he will be back to normal in three months.

[Dr. Edward Martin and Dr. Robert Le Conte, of Philadelphia, were present at this operation. The wound healed per primam. The man has been free from pain and has not had an untoward symptom. He will be kept in bed for fourteen weeks. Then a skiagram will be taken to determine the degree of osteal reproduction.—ED.]

FRACTURE AND DISLOCATION OF SCAPHOID AND SEMILUNAR BONES

HISTORY

PATIENT, male, aged twenty-nine, enters hospital on account of an injury to left wrist, the result of an accident which occurred eighteen days ago. While holding on to the top grab-iron of a box-car, it was struck by an engine with great force, causing him to relax his hold with his right hand, and throwing all his weight suddenly on his left wrist. His feet were knocked off the base-board by the contact. His body twisted around on his left wrist in a position of abduction. Then he released his hold and fell to the ground. He had no use of his wrist at all immediately following the accident nor since. Soon after the accident he noticed a mass above the wrist on the anterior surface. A temporary splint was put on. The next day he was given an anesthetic, and an attempt at reduction was made. It failed. Then a well-fitting tight splint and a roller were put on, causing him great pain. The bandage was so tight that his fingers were numb. This numbness gradually wore off. The dressings were kept on and he was brought to Chicago February 21, 1913.

Examination.—The skiagram indicates that the scaphoid bone of the left carpus is fractured and half of it is luxated. It is displaced upward anteriorly, one-half inch, resting on the lower end of the radius. The semilunar is completely dislocated. There is a concavity below the lower end of the ulna and radius, with only the pisiform contacting with the ulna, and a part of the scaphoid is contacting with the radius. The bones of the second or upper row of the carpus are disturbed in their normal relationship. By the removal of these bones through an anterior longitudinal incision and separating the tendons, and without opening the tendon-sheath, his wrist can be restored to its former

usefulness. The bones cannot be replaced. There is a concavity on the posterior surface of the carpus, due to the luxation of these bones.

COMMENTS AND OPERATION

DR. MURPHY: This history is a rather interesting one, because it shows so well just how the injury occurred. His left hand supported the entire weight of his body when his right grip was torn loose, and then the turn made by his body threw his hand back and his wrist forward, so that the lower end of the radius and ulna did the damage to the carpus.

This is the first case of this kind that I have seen, although dislocations of the carpal bones are hardly surgical curiosities. I have seen one case where one of the carpal bones was completely luxated. In another case two bones were partially luxated. In the case of the patient before us the semilunar bone is completely luxated, not only from the carpus, but up onto the radius; the scaphoid is fractured, the upper half being dislocated. These two bones are underneath the flexor tendons of the forearm. The fracture of the scaphoid is very evident. This type of accident often produces a luxation of the os magnum, either anterior or posterior, but in this case one can readily draw a mental picture of just how the injury resulted. Codman, of Boston, some years ago wrote a very fine paper on fractures of the os magnum and scaphoid, showing how they were responsible for useless wrists.

This patient's hand looks normal, and when his wrist is covered, there is nothing to lead one to suppose that anything is wrong. When you look at his wrist, there is a small tumor at the lower end of the anterior surface of the radius, and on palpation it may be concluded at once that it is a bone. By referring to the skiagram the diagnosis is readily made, but it could not be made without the skiagram.

There is a decided depression below this tumor. It is caused by the absence of these bones from the carpus. I can easily put my finger into this cavity. I will make a longitudinal incision on the anterior aspect of the wrist, just to the inner side of this

tumor, which is pressing against the tendons, immobilizing them, and rendering the hand useless. We must be very careful in our dissection not to cut into the tendon-sheath nor to injure any vessels or nerves. The median nerve is just outside of the tumor, and as we continue with our dissection it is easily recognized and differentiated from the tendons, because the tendons have a pearly-white color and are glistening, whereas the nerves have a pinkish color and do not glisten.

I displace the median nerve to the inner side, and then continue my dissection through these groups of tendons until I reach the bones. The articular surface of the semilunar bone is directed upward. This bone has become rotated. I can remove it very easily. Using the excitor, one finds that the nerve quickly responds. The fragment of the scaphoid also comes out easily.

We have had very little hemorrhage here, and we are now ready to close the wound. The tendons, you will note, were not injured in any way. A subcuticular catgut stitch and horsehair skin sutures closed the wound. We did not put in a drain. The arm will not be splinted nor placed in a cast.

[The subsequent course of the case was uneventful. The stitches were removed on the tenth day. When the patient left the hospital, three weeks after the operation, he had good use of his wrist.—ED.]

DISLOCATED SEMILUNAR CARTILAGE DIS- PLACED ACROSS MEDIAN LINE OF JOINT

HISTORY

PATIENT, male, aged twenty-nine, enters hospital on account of recurrent attacks of pain in and incapacity of left knee. Trouble dates back to September, 1911, seventeen months ago, when he slipped and fell, striking his knee on a steel rail. During that day he had several twinges of pain in the knee, but the knee did not interfere with his work. The next day he noticed that on taking a sudden step he would have an acute pain in his knee, and it seemed to lock. Then, by taking his weight off that leg, and with a little manipulation of the knee, it would be all right again. This condition gradually got worse, until he was unable to take a single step without the knee locking. His knee began to enlarge after each locking and swell slightly and be very painful, until, after two weeks, the joint was very large and painful. He entered the hospital, where injections (?) were made into the joint. Condition was better for several months, when he slipped again and fell, dislocating his hip and fracturing the neck of the femur. After the rest in bed demanded by the treatment of the fracture his knee seemed better for some time afterward, but now he feels the knee lock again when he flexes it suddenly, and it swells and becomes painful for several days. He now uses a crutch all the time to keep his weight off the leg. Contracted lues in 1911.

COMMENTS AND OPERATION

DR. MURPHY: Looking at the skiagram, there appears to be something in the track of the x-ray. It does not look like a normal semilunar cartilage. Looking at it the second time, it seems as if he might have had a fracture of the internal tuberosity. The

bone level on the inside is a little below the bone level on the outside. He first had the locking of the knee; following that he had edema and swelling, and following that he had an effusion into the joint. The external condyle of the femur is, if anything, a little high. The internal condyle is not on a level with the external condyle. That is what makes me think that when this man struck the rail the first time he had an impacted fracture that took off a corner of his tuberosity. That is about the way it looks when he flexes the knee suddenly.

He had lues in 1911. That must be taken into consideration. A spirochetic infection is a dangerous factor in all traumas of joints. As you look at that skiagram you will notice that the internal condyle, the internal tuberosity, the internal half of the joint, is lower than the external. That means that he had a pathologic process going on in the joint, in the cartilage, in both tuberosities and condyles, the result of recurrent traumas. The most important feature that I wish to bring out is that the joint is not movable. If he had a depression of his tuberosity, as it appears he has, he should have an impingement of the internal tuberosity against the femur, and that is why he would have an immovable joint.

Luxations of the semilunar cartilage occur much more frequently in the internal cartilage than in the external; that is, in a proportion of 50 to 1. If we simply take the story of the trauma, we would consider this an ordinary case of luxation of the semilunar cartilage, but he has an additional complication here. The condition shown in the picture might be from his trauma or from his spirochetic infection. There is some fixation of that joint. The internal condyle is a little higher than normal.

I will make my incision close to the ligamentum patellæ, on the inner side, going below the tuberosity so as to give me a little better view of this joint. I am cutting upward right along the margin of the quadriceps tendon. The internal tuberosity stands out much more prominently than normal. Either that is due to the spirochetic infection or it is the result of the repeated traumas. We may be able to determine that later. Note what a great quantity of tissue there is between the capsule and the



Fig. 85.—Luxation and fracture of carpal bones. Lateral view, showing the change in position of all the carpal bones, with a dislocation of apparently only one bone on the anterior surface of the lower end of the radius.

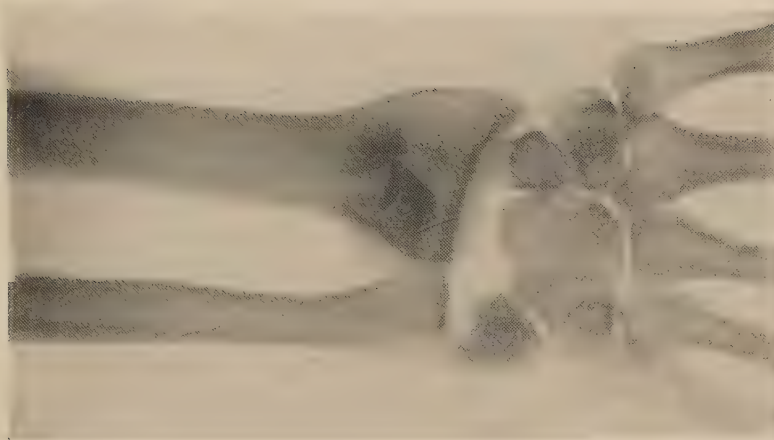


Fig. 86.—Anteroposterior view. Dislocation of the pisiform bone on the anterior surface of the unciform. Dislocation of the semilunar upward on the radius. Fracture of the scaphoid, with a dislocation of the upper fragment on to the anterior surface of the radius. The normal anatomic arrangement of all the bones of the carpus, except the os magnum and the unciform, is destroyed.



Fig. 87.—Dislocation of the semilunar cartilage. Lateral view of the affected joint, showing the irregularity in the upper surface of the tibia from which the semilunar cartilage was dislocated and fractured.

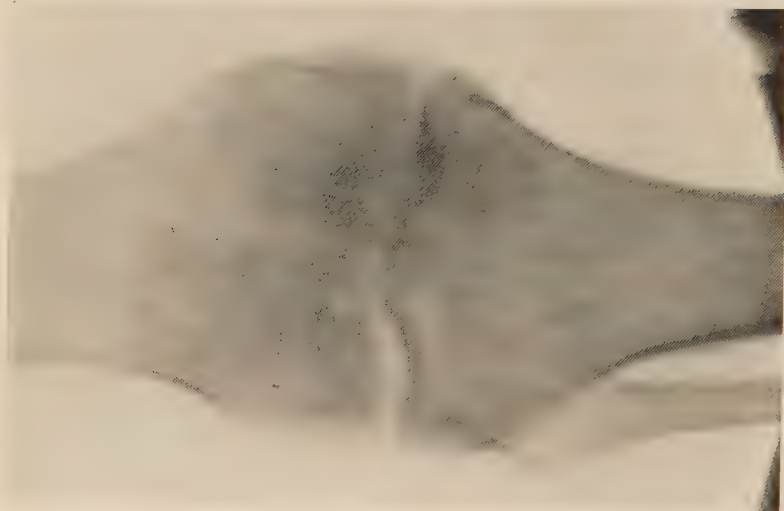


Fig. 88.—Anteroposterior view, showing the internal condyle of the femur in close apposition with the internal tuberosity, from which the internal semilunar cartilage is dislocated. Obliteration of joint cavity on inner side.

synovial membrane. Now we are coming into the joint, and there is the synovial fluid. I do not wish to injure the synovial membrane, because it might lead to an ankylosis. That is not a normal cartilage. It corresponds exactly with the skiagram. The cartilage is in my field in plain view. Some ossification has taken place on the surface of the inner tuberosity. The whole field is more vascular than normal. There is a strip of the cartilage worn by repeated friction down to a point. That cartilage has fractured or split and half of it thrown over into the middle of the joint. I have loosened it. It shows that the pathology is in perfect consonance with the history. There is a cicatrization and thickening of the semilunar cartilage, so that it is very much harder than the average semilunar cartilage, due to the constant irritation of the trauma. It is entirely traumatic, and not the result of the spirochetic infection. Instead of being a soft, smooth cartilaginous tissue, it is hard and thick. You can all see the change in the cartilage. See what a different picture that is from the normal cartilage! The normal cartilage is all destroyed by the repeated traumas.

The synovial membrane is also thickened. The reason I do not fear infection in this case is that the synovial membrane is ready for resistance against infection, as if I had injected formalin and glycerin.

You will note that in handling that knee I allow nothing to enter the joint but that sponge and the instruments. That is the key to keeping the field sterile. The outer layers of the synovial membrane under the fibrous capsule become infected first. The inner layers become involved only after the other tissues have all been destroyed.

Having removed this cartilage, I am ready to close the wound. The fibrous capsule will be sutured with plain catgut, and the skin with horsehair. The capsule is very thick. You can see why, when infection takes place in that joint, it is held under great pressure because that fibrous capsule has very few lymphatics and no vascularity, and it is firm, like a leather bottle. That is why you do not get edema and swelling of the tissues outside. That is why you do not have an early escape of

the infective microorganisms from within the joint out into the surrounding cellular tissue. That is what occurs in infections in other portions of the body. This is an inelastic white fibrous capsule that stands a hydraulic pressure of from 20 to 100 pounds and more before it ruptures, and it is not rapidly destroyed because of its non-vascularity. That is why, when we inject the joint with infective micro-organisms experimentally the joint does not become infected unless we have destroyed the endothelial layer of the synovial membrane so as to admit microorganisms into the subendothelial lymph-spaces and vascular channels. We know that the synovial membrane, the subsynovial membrane, the cellular tissues, are very easily infected and rapidly destroyed on account of their vascularity. You can see what an enormous destruction has taken place within before the outer wall gives way. That is how joints are destroyed, differing from the infection in the cellular tissue in other portions of the body.

A Buck's extension will be put on this leg and kept on for three weeks until all the reaction to the trauma has subsided. He can carry about 20 pounds. This zinc oxid plaster irritates the skin. The old diachylon plaster was the ideal plaster for the skin. All the zinc oxid plasters irritate the skin. They are especially irritating if you have to sterilize the skin with iodine. If you use the old diachylon plaster, there is no irritation of the skin. I am endeavoring to get a plaster to take the place of this one. [Such a plaster has since been found. It is made by Charles Shivers, of New York. It is known simply as an adhesive plaster.—ED.]

Let the record show that the central portion of the cartilage covering the internal condyle was thin and worn out and almost destroyed. This was due to the fact that when the cartilage fractured and stretched, it rested across the middle line of the joint. That is why he had contusion after contusion in place of a stretching from side to side. That has also produced a similar change in the cartilaginous surface of the internal tuberosity. The condition resembled an acute inflammatory infection of the joint. There was no velvety condition of the synovial mem-

brane, and no evidence that the patellar tubercle was contused and fractured. I never saw a cartilage going across the middle line before. It was fixed at the tip and loose at the base, never going in and out. There was a continuous pressure on the cartilage, and you can see that no amount of local treatment could ever give any relief. [Healing by primary union. Patient left hospital in four weeks.—ED.]

INFECTIOUS GRANULOMA OF THE CAPUT COLI—RESECTION OF THE CECUM AND ANASTOMOSIS OF THE ILEUM TO THE ASCENDING COLON

HISTORY

PATIENT, male, age forty-four, enters hospital on account of colicky pains in the epigastrium, belching of gas, and a hernia in the right lumbar region. September 2, 1912, the patient had an acute attack of appendicitis, and on the next day was operated on. The appendix was gangrenous, and free pus was present in the abdominal cavity. This was drained, the tube being left in about three weeks. Four weeks after this operation, and while still in bed, he was operated on for hemorrhoids, which were causing him great pain. At the end of the eighth week he left the hospital, feeling weak but in fairly good condition. The latter part of November he noticed a hernia appearing at the site of the abdominal wound. This has remained about the same in degree up to the present time. He is always tender around this region, but otherwise has no symptoms.

January 23, 1913, about five weeks ago, had a severe colic in the epigastrium. It came on suddenly and lasted about two minutes, when he was able to belch up some gas. This relieved the colic. These attacks kept coming on every three to four minutes the remainder of the day, and have continued up to the present time. He has not vomited nor even been nauseated during these attacks. Has been on a liquid diet because if he eats solid food the colic becomes so severe and his stomach so full of gas that the distress and pain are unbearable. When he does not eat anything, the symptoms are not so severe but do not disappear entirely. He is constipated, but there never has been any blood in the stools to his knowledge.

COMMENTS AND OPERATION

DR. MURPHY: Where was the pus, inside or outside of the peritoneal cavity?

INTERN: It was a peri-appendiceal abscess.

DR. MURPHY: How soon after the onset of the symptoms did the abscess rupture?

INTERN: Six hours.

DR. MURPHY: That is a very rare occurrence. It is barely possible that this was a case of enterolith in the appendix which ulcerated through the wall of the appendix and was not found at the operation. That has happened more than once. He has had symptoms that simulated appendicitis since the operation. He had two attacks before he came here. He entered the hospital in the third attack. If I did not know that his appendix was out, I would say that he has appendicitis now. On palpation of the abdomen we found an infiltration of the caput coli. Whether that is an acute inflammatory infiltration or whether it is a tuberculosis, or an old peri-appendiceal abscess that has formed slowly from a fecal concretion lodging in a mass of adhesions we cannot say. That mass at first seems to be as large as my hand, but on slow manipulation it gradually diminishes in size until it is no larger than my finger. How high was the temperature in this last attack?

INTERN: 102° F.

DR. MURPHY: What was the leukocyte count on admission?

INTERN: Twenty thousand.

DR. MURPHY: That may mean that he has a malignant lesion of the caput coli. Again, it may be a tuberculosis originating in the appendix. He is a man of fairly good habits. The Wassermann reaction was negative. His leukocyte count has been dropping down almost constantly since he came here. His temperature has been rapidly diminishing but he is still suffering, notwithstanding that the tumor mass had diminished in size fully 80 per cent. We are going to expose his caput coli and do whatever is necessary.

These fecal concretions in the appendix often give quite a

bit of trouble. The second case of appendicitis in my experience was one with a fecal concretion in the appendix. I had operated in the morning at Cook County Hospital, doing my first appendectomy that day—March 2, 1889. When I got through with that operation they asked me to come over to the medical side and see a case of typhoid perforation. The girl gave a history of a typhoid. After recovery she had been apparently well until shortly before I saw her. She was scrubbing the floor four days before. The floor was wet, and when she got up from her knees she slipped and fell, landing on her right side. Immediately she had sudden pain in the abdomen. The pain got steadily worse, and was very severe when she was brought to the hospital three days before I saw her. The story she gave me was that she began to vomit after the onset of the pain. I had just read Krafft's famous article on the surgery of periappendiceal abscess due to the appendix, and was familiar with Fitz's article on the medical phases of infections of the appendix—the two great papers on the appendiceal problem. Krafft wrote his article in 1888, two years after Fitz wrote his. I made a diagnosis of ruptured appendiceal abscess, basing the diagnosis on Krafft's analysis of his cases. Krafft had collected the histories of his cases and reported them as pathologic curiosities. I was positive that this girl had had appendicitis one year before and not a typhoid, as was said. We operated and drained a diffuse peritoneal abscess. She was then moribund. She died four hours after the operation. Rather high up in the appendix was a stone—a wedge-shaped stone. It rested half in and half outside of the appendix. Outside of this was a circumscribed, dense-walled periappendiceal abscess which evidently had been present for a year. On the under margin of this was a small hole, showing a recent rupture, which permitted the pus to escape into the free peritoneal cavity and this caused the general peritonitis which was present at the time of operation. Evidently, when her foot slipped, the contraction of the abdominal muscles caused the abscess to rupture. I never had an appendicitis case before that time, and I had two in one day. That was my initial experience. The fact that the stone stayed

partially in the appendix and partially in the abscess this long period of time is one of the points to be remembered in connection with this case.

The pain in the case before us occurred in the caput coli region. It occurs much more commonly in the sigmoid and descending colon, but more commonly in the sigmoid. The temperature dropped rather suddenly on the second day of the attack. He had a high temperature for three days, then it dropped suddenly and it has been normal ever since.

When he is thoroughly relaxed, there is quite a mass here. I am making my incision to the inner side of the old incision, going through the right rectus muscle. There are extensive adhesions present. I do not know whether this is the sequence of an infection, the sequence of the drainage, or the sequence of a tuberculosis. Those cobweb adhesions are always suspicious. They occasionally occur, however, in an inflammatory condition, entirely independent of tuberculosis. Now we are coming along to the position where this mass is located. I am going to separate these adhesions carefully with my finger. There are large pockets of pus here. There is a fecal discharge. Sometimes you get a number of these abscesses emptying into one pocket. I remember seeing as many as 25 emptying into one pocket. There appears to be a neoplasm or ulcer down in here involving the anterior surface of the cecum. There is quite an extensive infiltration; in fact, it is a firm, woody mass, so that I believe we are justified in removing the caput coli entirely, making an approximation between the ileum and the ascending colon. We will free the bowel from these dense adhesions in which it is embedded, and exsect about four inches of the colon, including the caput coli. The bowel is clamped transversely, divided with the knife flush with the clamp, and the stump cauterized with the actual cautery. The stump will be embedded exactly the same as we embed the stump of the appendix. Two rows of sutures of Pagenstecher linen will close the bowel. The first or innermost row is of the Czerny-Lembert type, and includes all the coats of the bowel. It is an in-and-out stitch. Each stitch goes through all the coats. The

second or outermost row is of the Lembert type, including only the serosa. It is a reënforcing suture. That completes the inversion. Next we will divide the ileum about two inches to the left of the ileocecal valve, in the same manner as we did the cecum, and now we remove the mass.

The mass is rather firm in consistence, and measures about 2 inches in length and $1\frac{1}{2}$ inches in its greatest diameter. It may be a sarcoma or a tuberculosis. On the other hand, the infectious condition from which this man suffered previously may be the cause of all this trouble, so that we must think of an infectious granuloma before making a positive diagnosis of the mass. It gives with not much difficulty, and it looks like a cellular mass of tissue. That means we will have to differentiate between a sarcoma and an infectious granuloma. So far as we are concerned, however, we are entirely justified in removing the tumor, because the patient could not have been given any relief from the obstruction in any other way.

The caput coli was enormously infiltrated, and it was surrounded by many dense adhesions. It was impossible to differentiate between a carcinoma, granuloma, sarcoma, or tuberculosis; therefore no other course was open to us than to make a resection. We feel that this man will be entirely relieved from his symptoms of obstruction so that the end fully justifies the means.

We will anastomose the divided end of the ileum with the side of the ascending colon—a typical end-to-side suture anastomosis. This will be done in the usual manner, making the opening as large as possible, so that any contraction which may occur subsequently will not interfere with the free passage of the intestinal contents from the small into the large bowel. There is no hemorrhage here, because the cautery has closed the ends of all the vessels. We will not use the button, simply making a suture operation. Pagenstecher's linen is the material used. That makes a very satisfactory operation, not only for the operator, but for the patient. The hole in the mesentery will be closed with a puckering-string catgut suture. Because of the infection present in this case the abdomen cannot be closed without

drainage; therefore a rubber tube drain about as large as a lead-pencil will be inserted through the wound down into the abdomen, in the position behind the line of intestinal approximation. We will also pass a rectal tube and keep it there for two or three days. The peritoneum will be closed around the tube with catgut, making an ectropion of the edges of the incision. Catgut figure-of-8 and silkworm-gut sutures complete the closure. The point of the drainage-tube will be fixed in position with a silkworm-gut suture.

[The patient made a rapid and uneventful recovery. He had no pain after the operation and no distress. The rectal tube was removed on the fourth day, and the peritoneal drain was removed on the eighth day. The abdominal wound closed primarily, and the patient left the hospital entirely well three weeks after the operation. Microscopic examination of the tumor mass showed it to be a typical infectious granuloma.—ED.]

ARTHROPLASTY OF THE HIP—TROCHANTER PLACED IN ACETABULUM TO FORM A NEW JOINT

HISTORY

PATIENT, male, aged forty-six, enters hospital on account of dull, throbbing pain in left hip, and also a pronounced diminution in size and marked shortening of left leg. Present trouble dates back forty-three years, when he was three years old. He was awakened one night with excruciating pain in left hip, and cried out with agony. Pain lasted only a few minutes, and he slept the remainder of the night. A few days later an extension was put on left leg and continued for a few weeks. Then a plaster cast was applied from toes to abdomen. Had no pain after application of extension. Cast was kept on for eight months, and on its removal marked shortness of the leg was noted. Patient experienced no more discomfort, except from the shortening of the leg, until seven years ago, when, while walking, he was suddenly seized with an agonizing, drawing pain in left hip, lasting a few minutes. Pain was terrific, and so severe that he could not catch his breath. Since then he has had occasional shooting pains radiating from hip to knee, but the more severe pain is continuous, dull, sometimes throbbing. This pain seems to be worse at night, and has resisted every manner of treatment for seven years. The pain is equally severe whether he is sitting or walking, and the only relief obtained is by means of morphin. Has always been well otherwise. Family and venereal history negative.

COMMENTS AND OPERATION

DR. MURPHY: When was the date of the onset?

INTERN: Forty-three years ago.

DR. MURPHY: Where is the pain?

INTERN: Between the trochanter and the tuberosity of the ischium.

DR. MURPHY: What nerve is causing that pain?

INTERN: The sciatic nerve.

DR. MURPHY: He did not tell you that. He said the pain is anterior to his sciatic nerve. The sciatic is not sensitive to pressure. The pain is over the trochanter. This is a very unfortunate case for operation—unfortunate in two ways: first, because he says he has pain all the time, which means that he has a continuous irritation of his hip; and, second, because he says he is taking 8 grains of morphin a day, which means that you can double or triple that amount. It is difficult to tell how much is morphin pain and how much is genuine pain. When you look at the skiagram from one position it looks as if he has a bony ankylosis; from the second position it looks as if he has no ankylosis. He has a certain amount of motion, which gives him the pain. The acetabulum is filled with new bone. The head and neck of the femur have disappeared completely. The trochanter is very much enlarged, club shaped, and is impinging on the bone above the acetabulum. We will clean out the acetabulum and shape the trochanter so that it will answer the purpose of a new head, place it in the acetabulum, interposing a fat and fascia flap to prevent ankylosis. That will give him a new hip-joint. He is out of commission because of the pain. If we can relieve him of his pain, he can become a producer again instead of being a burden on his friends. This leg is about 4 or $4\frac{1}{2}$ inches shorter than its fellow. The muscles are atrophied, because he has never used the leg from infancy. He never walks on it. It is too short. I believe there is some motion in that hip.

With the patient lying on his right side, we make the U-shaped incision. This flap will be retracted upward so as to expose the trochanter. Next we pass a chain-saw under the muscles attached to the trochanter, and remove about two-fifths of the trochanter. When this is retracted upward, the joint is in view. There is an abscess on the anterior surface of



Fig. 89.—The acetabulum is filled with bone. The head and neck of the femur have disappeared completely. The trochanter is enlarged, club-shaped, and impinges on the bone above the acetabulum.

the trochanter, at the point where the neck of the bone ought to be. This is unfortunate, as in all cases in which we found pus we have had trouble with the healing. That accounts for the pain. By making traction on the leg and adducting it away across the middle line of the body the acetabulum becomes easily accessible. There is a fragment of bone firmly attached to the upper rim of the acetabulum, and impinging against the trochanter. We will remove this piece of bone with the chisel. The bone in the acetabulum will also be chisled out, and a new acetabulum made with our special reamer. This is fine! This is a much better result than anything I thought I could get. See what a true acetabulum we have here now! The upper end of the trochanter, *i. e.*, portion of the shaft on the neck side, will next be rounded off and shaped with the end mill so as to fit the acetabulum, and then we are ready to interpose the trochanteric fat and fascia flap, which will be dissected free from the under surface of the original skin-flap. The base of the flap is above. This pedicled flap covers over the acetabulum and will be sutured to its margin with phosphor-bronze wire. We have a splendid interposing flap, with a good circulation, insuring its continued vitality. That will give him a splendid joint, and were it not for the presence of pus, we could predict a good result with positiveness.

The trochanter will now be nailed back in place, and the cut edges of the periosteum at its base approximated and sutured with phosphor-bronze wire.

There was a fibrous ankylosis only, fixing the femur in an angular manner to the ilium. It was at this point that there was pressure of the trochanter against the enlarged margin of the acetabulum. Nothing remained of the acetabulum except its elevated and thickened margin. The cavity was filled in with bone. The skin will be sutured with horsehair.

Let the record show that there was an abscess on the neck of the trochanter; on the upper margin of the acetabulum was a spicule of bone which stuck out into the trochanter. This was freed. This was a great source of irritation. The upper half of the old trochanter and the upper half of the neck were chiseled

off on a level with the shaft. When this was completed, we were able to throw the remaining portion of shaft out of its contact with the ilium. A new cavity was then chiseled out of the ilium with the curved chisel, resembling the former acetabulum. It was smoothed out with the reamer. Then the end mill was used on the end of the shaft, and this was rounded off so that it resembled fairly well the normal head, except that it was directly above the shaft, with no neck. This rested again in a fair acetabulum. An interposing flap was then prepared from the trochanteric fat and fascia. It was in excellent condition, with a good blood-supply. This was stretched over the new acetabulum and secured with phosphor-bronze wire all around its margin to the remainder of the former capsule, so that the new head will rest on this flap. After this was accomplished the trochanter was nailed back in the usual way. By adducting the leg we were able to rupture the adductor tendon close to the symphysis, as was indicated by the sinking in of the skin at this point. Both legs will be placed in a travois splint in abduction, and a 20-pound Buck's extension will be put on the limb. The usual dressing of the wound was made—bismuth subiodid powder, collodion gauze, 5 per cent. moist phenol gauze, and a sterile gauze dressing held in place with a roller bandage and adhesive straps. [As was feared at the time of operation, he had supuration and discharge from the wound for weeks. He was intensely sick. Now the process of repair is advancing. He is regaining strength. There is still some pus discharge, but he has quite good motion in the hip and the leg is in good position.—ED.]

(WED.)
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POTT'S DISEASE

The Operation of Bone-grafting for its Cure, as Devised by Dr. F. H. Albee, of New York City

A TALK BY DR. F. H. ALBEE AT THE CLINIC AT MERCY HOSPITAL ON
FEBRUARY 19, 1913

DR. MURPHY: Gentlemen: We are honored by having with us today a man who is the first to make orthopedic surgery not a borderline surgery, but a part of real surgery. He has struck out into a new line, and that is what makes him a genius. That he has succeeded, his operations show. I have the pleasure of introducing to you Dr. Albee, of New York.

DR. ALBEE: I do not know as I shall be able to say hardly a word after such a flattering introduction by Dr. Murphy. In fact, it was only after some hesitancy that I agreed to say anything.

Continuing along the line of Dr. Murphy's remarks, I might add a few words relative to the work in which I have been engaged. In the first place, you all know, as I do, that Dr. Murphy has no equal in the work of bone-grafting. He has given bone-grafting in surgery the greatest impetus which it has had in many years. I agree with him in his teaching as applied to my branch of surgery, in which bone-grafting has a wide application. The field of the bone-graft in orthopedic surgery I am sure is destined to enlarge far beyond the application to which we have had the privilege of using it thus far.

It might be interesting to mention some facts relative to the 104 cases of Pott's disease of the spine on which I have operated in the last twenty-two months, and in which I have used bone-grafts. Some of these cases had a psoas abscess and some para-

plegia. That Pott's disease is amenable to treatment by bone-grafting is shown by the excellent results obtained in these cases. In every case of paraplegia the paralysis has cleared up, the time varying from three to five months.

Now, what are the premises on which we plan this operation? What is necessary in the treatment of Pott's disease of the spine? We know that mobility of the vertebræ infected with tuberculosis keeps up the process, and this applies particularly to the dorsal spine, owing to respiration. It is difficult to say precisely from what influences artificial pneumothorax derives its beneficial results. Rest and immobilization of the diseased lung tissue is the most important part of the treatment. It is certainly true in tuberculosis of the joint that perfect fixation with fresh-air treatment is as near as we can come to a specific. We have been encouraged in this by the report of Ely, which has been worked out from his pathologic studies. He says that it is only necessary to secure a bony fixation in joints in order to get a rapid disappearance of the tuberculous process. The next thing necessary is to prevent the crushing of the vertebral bodies, of course assuming that the tuberculous process occurs only in the vertebral bodies. This crushing of the cancellous structure not only favors extension of the disease, but produces an increase of the kyphotic deformity. Yesterday I saw at the hospital a man who had Pott's disease for forty-one years—since he was four years old. It had spread from one vertebra to another until nearly the whole dorsal spine had become involved. You can, therefore, see the value of this bone-grafting when you compare the relatively greater value of a bony ankylosis with a fibrous ankylosis.

One of the inspiring things about bone-grafting is its possibilities. In a letter I have just received from Dr. Twinch, of Newark, N. J., who assisted me in a case that had been under conservative treatment for seventeen years, and who had developed a pronounced kyphosis and paraplegia, he writes that the patient is now able to walk—ten weeks after the operation. In that case we split the spinous processes and bent in the bone-graft.

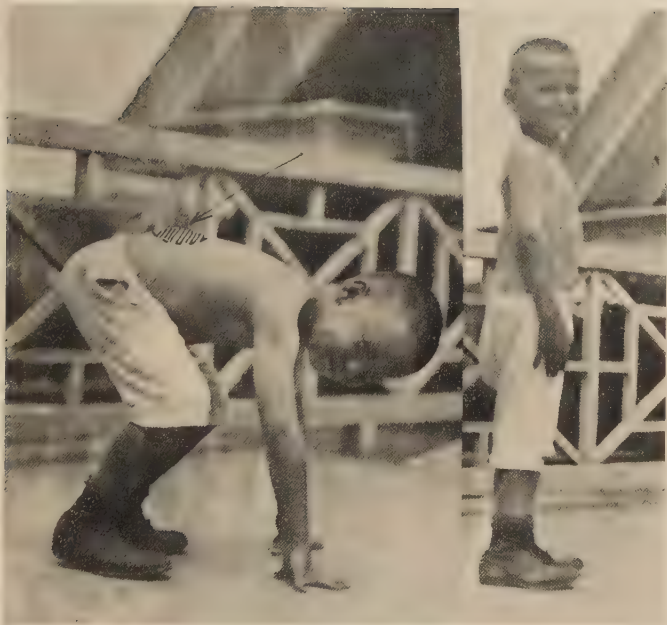


Fig. 90.—This boy, a very acute case of Pott's disease, was operated on at the Post-Graduate Hospital, New York City, over twenty months ago. No plaster jacket or brace was used. These photographs show him as he is now, and the flexibility of his spine above and below the graft.

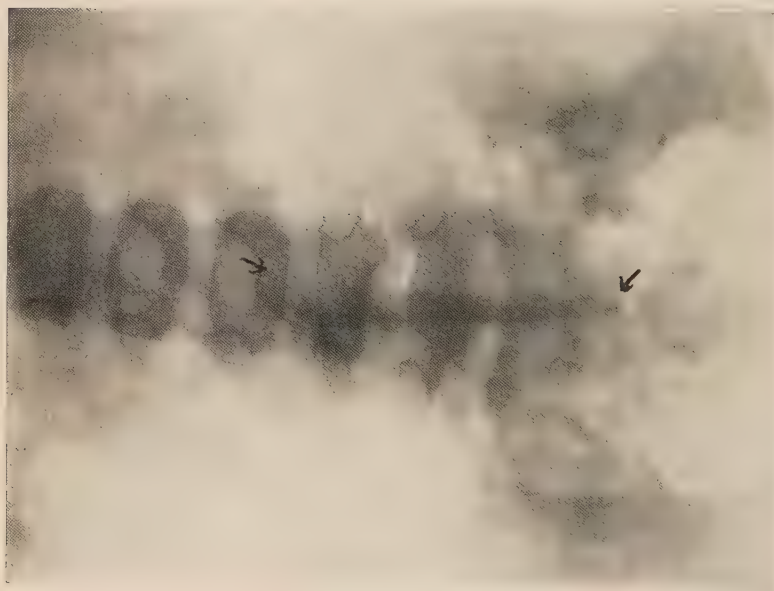


Fig. 91.—X-ray taken six months after operation. Case of acute Pott's disease. Child was kept on gas-pipe frame for seven weeks. Symptoms were immediately relieved after operation, and have remained so. Child runs about and plays like normal children.

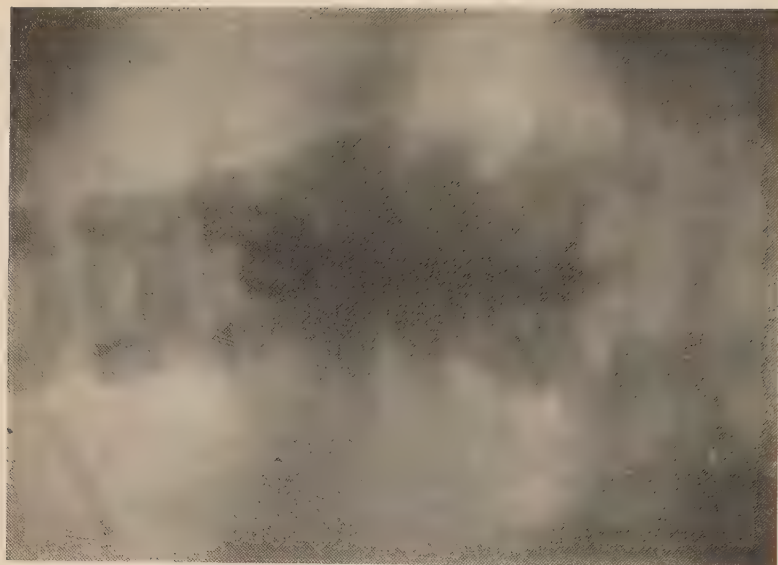


Fig. 92.—Anteroposterior x-ray taken eighteen months after bone transplantation operation. The graft, as well as the vertebral bodies, has increased in density since the operation.

In the first 50 cases the bone-graft was removed from the tibia by means of a chisel and mallet.

We now remove the bone-graft, usually by means of the motor saw, which we find shortens the time of operation materially, increases its accuracy, and furnishes a section of bone of a more adaptable shape and size to fit into the groove formed by the split spinous processes. Our main object is to splint the diseased area, but we can also at the same time straighten the kyphosis appreciably. In cases of long duration we probably do not correct the curvature of the spine so much as we produce a bony fixation. In some of our cases we have succeeded in making a complete correction of the kyphosis. In others we have secured a small amount of correction of the kyphosis by previous fixation on the gas-pipe frame before inserting the bone-graft.

One of our original uses of the bone-graft was in cases of deformity of the lower extremities. In certain congenital club-feet in children over three years of age, where adduction of the fore part of the foot is a prominent feature of the deformity, a wedge-shaped bone-graft taken from the upper end of the tibia was inserted into the scaphoid bone. We have also taken out a wedge from the cuboid in cases where that bone is much hypertrophied and oblique in its position, and forced it in between the separated halves of the split scaphoid bone (on the inner side of the foot), thus propping the foot into a corrected position. A relapse is not likely to occur, and the continued use of braces is unnecessary, as is often the case after the Phelps operation, or other soft tissue operations where we have to hold the foot corrected by means of a brace.

The bone-graft has been used to advantage in ununited fractures of long standing in long bones. In such cases we have inlaid into the cortex of the fragments a bone-graft taken from the tibia, of sufficient length to bridge the fracture and sclerosed portion of the ends of the fragments, and reach well into the normal bone structure in both fragments, just as a cabinet-maker inlays a piece of wood. This method has been used with 100 per cent. of successes in 12 cases, and it is believed to be preferable to Codivilla's periosteal bridges.

Dr. MURPHY: I am pleased that Dr. Albee has laid so much stress on mobility as the etiologic factor in the continuance of the tuberculous process. That is a very important thing. I was glad to have him mention the immobilization of the lung by artificial pneumothorax in connection with the prevention of the spread of the tuberculous process in the lung. You will remember that in 1898 I read a paper on that subject before the American Medical Association at Denver, and predicted that it was to be the future treatment of tuberculosis of the lung. It was not taken up by my American colleagues, and since that time the treatment of pulmonary tuberculosis has gone out of the domain of surgery into that of medicine. Dr. Lemke carried out this work for a long period of time before his death. Since that time the work has been done in only desultory manner. Fortunately, the Germans took it up recently, and now they are vying with each other to see who can do this operation the most frequently. After the method has received the proper German baptism, it will come back to America and be used here, because the principles are right and principles are eternal.

There is no type of treatment that is as important as the method of immobilization in treating lesions of the spine, as was just mentioned by Dr. Albee.

REMARKS BY DR. J. B. MURPHY IN DISCUSSING THE PAPER READ BY
DR. F. H. ALBEE AT THE MEETING OF THE CHICAGO MEDICAL
SOCIETY, ON THE EVENING OF FEBRUARY 19, 1913

Mr. President and Members of the Society: I have been very much interested in Dr. Albee's paper. I concur in all the things that he says concerning bone-grafting, and I am delighted that the orthopedists have finally come to a renaissance and have gone into real active work in our branch of surgery.

The question that is not settled in this work on diseases of the spine is, What will be the final outcome of the case? This method of bone-transplantation for Pott's disease has not been in practice long enough to allow us to draw definite conclusions. When the spinous processes have been fixed for a time, will the patient develop another kyphosis as the result of his growth?

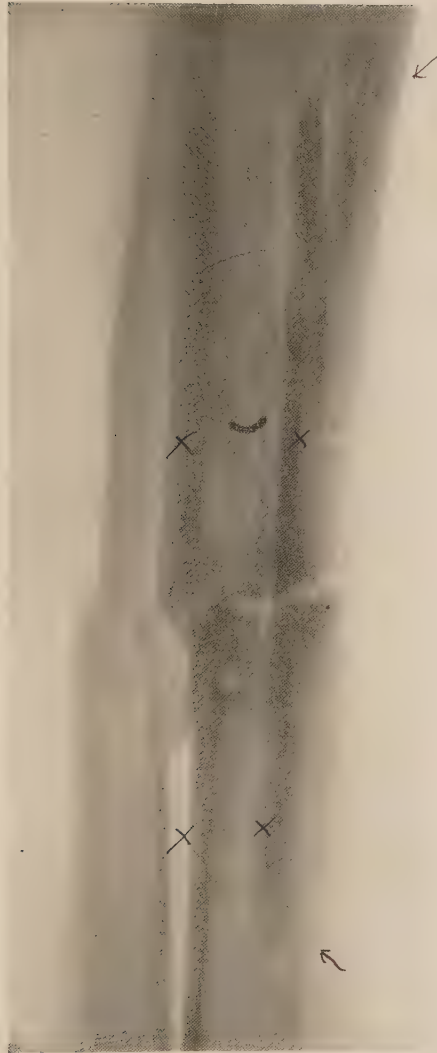


Fig. 93.—Ununited fracture of the tibia and fibula of ten and one-half months' non-union. Graft five inches long taken from crest of his other tibia and inlaid according to technic described elsewhere. Leg was firm five weeks after operation, and has remained so—now eighteen months. This skiagram was taken three and one-half months after operation, and, as will appear, there has been practically no osteogenesis from the ends of fragments themselves; the union has depended upon osteogenesis from the graft.

We undertook to demonstrate that last summer during my vacation. Dr. Zapffe carried on the experiments. He took one subperiosteal graft from the tibia and fixed it to the tips of the spinous processes in a three-weeks'-old pup. In a second experiment he transplanted a similar graft onto the bodies of the vertebræ extraperitoneally. What happened as the pups grew? The first died one month after the operation. The last dog on which the experiment was tried died five months after the operation, and through the bungling of the man in charge the dog was burnt, so that we have no permanent record of the experiments. However, what I wanted to bring out was that as the last pup grew it developed a most pronounced kyphosis. He looked like a young camel. Why that should happen we could not tell. It is generally believed that a transplant does not grow in length. (Bones grow in length only from the epiphysis. If the graft is fixed to the anterior surface of the body of the vertebra, as the posterior portion of the vertebral body grows, does it tend to develop a kyphosis? In the case of children, where the spinous processes have been fixed, according to Dr. Albee's method, will that fixation be permanent? The doctor says it will and we believe it will. If not, what must happen? A kyphosis will be developed.

Now, then, we come to the essential point in bone transplantation. The limit of extent of bone transplantation is settled. That the transplant needs or does not need periosteum is not definitely settled, but that does not matter. We do not care as surgeons. We can always remove the periosteum with the transplant because it is always available. That you can transplant, as brought out by Dr. Albee, any length of bone is true. I had a case of osteomyelitis of the tibia recently in which only a small button of the internal malleolus was left, and about four inches of tibia above. I put in a ten-inch transplant removed from the opposite tibia, contacting it with the portion of malleolus below, and we already have a good result. All that is needed is contact with living osteogenetic bone, no matter how small the contacting surface may be, and any size transplant that can be obtained will live, provided it remains aseptic.

I was very much pleased with the statement made by Dr. Albee about asepsis. I have had 100 per cent. of successful cases of bone transplanting to date. Until yesterday I thought that I was going to have a failure. I transplanted a piece of bone into an osteomyelitic tibia some three or four weeks ago in the case of a boy who was in the second week of an attack of grip. We believed that he had recovered, or we would not have operated. He got a hematogenous infection around the transplant, and at one time I thought I would have to remove the transplant. Yesterday, I cut down on it, exposed it to view, and to my great delight found the graft was living.

Whether the transplant has a medulla or a cortex does not matter at all. We have had cases in which the graft had no medulla. In one case, which I reported, the transplant contacted with living osteogenetic bone at only one end. I had another case in which I transplanted $5\frac{1}{2}$ inches of the tibia into the upper end of the femur, which had been removed because of a sarcoma. We replaced the muscle attachments in approximately their normal position, fixing them to the transplant with a wire nail. In putting in the nail I fractured the transplant. I could not remove another piece of bone from the tibia from which the first fragment was taken, and I could not remove a piece from the leg on which I was working, so I simply wired the fragments of the transplant together. The upper fragment was separated entirely from living bone. It was not contacting with living bone—merely with the lower fragment of the transplant. The skiagram showed later that not only was regeneration going on through both fragments of the transplant, but a fairly good trochanter was developed.

I am pleased to have the orthopedists take the stand that there is no limitation to the use of a bone-transplant; that these fragments of bone can be put into the spinous process, as Dr. Albee has shown, and live. This method is the final step in the repair of tuberculous disease, and I am sure that is what Dr. Albee is trying to bring out tonight. What the final results will be, time alone can determine. Tuberculosis will not disappear in a week or in four or five weeks. Any man who has made a

study of the pathology and repair of tuberculosis knows that that is true. Whether the fixation which is produced by this bone splint which fixes and immobilizes the spine will favor the rapid and permanent cure of the tuberculosis, we are unable to say. We have always believed that no matter whether it be tuberculosis of the lung or tuberculosis of the bone, that perfect immobilization will give the very best aid to the process of cicatrization. It is the formation of connective tissue around the tuberculous process—an encapsulation that prevents the spread of the process.

CLINIC AT ST. LUKE'S HOSPITAL, CHICAGO

BY DR. FRED H. ALBEE, OF NEW YORK CITY, ON
FEBRUARY 20, 1913

DR. ALBEE: I do not wish to say much, for fear of repetition, but there are a few things which I think were not brought out clearly enough last evening. In the first place, I would like to make a little clearer the rationale of this operation. The object is to produce a bony fixation and to prevent the irritation of motion and crushing of the vertebral bodies, and thus stop the progress of the kyphotic deformity and the tuberculous process. Nature is not efficient in combating tubercular joint disease, because of the slow and meager osteogenesis which takes place in an active tuberculous joint; thus respiratory motion and vertebral crushing from superincumbent body weight and muscular spasm are unlikely to be presented, and the progress of the disease is unabated.

The success which attended my operation for ankylosing tubercular ostitis and osteo-arthritis of the hips during the past six years in numerous cases led me to endeavor to devise some method which would apply equally well to tuberculosis of the spine.

I believe there are few cases of tubercular ostitis of the knee in which an erosion has been performed with a resultant bony ankylosis, in which the tuberculous process has not subsided

rapidly. It is very satisfactory to produce a bony stiffening of the tuberculous knee, and still better of the tuberculous hip, because in the latter instance there is compensatory motion at the lumbar spine, which is in a plane only approximately $2\frac{1}{2}$ inches higher than the hip-joint.

The operation which we have been doing for some time for tuberculosis of the knee has not for its object the removal of all the diseased tissue. The aim has been to remove as little of the bony tissue as possible for the purpose of fixation. When ankylosis is secured, the diseased area is fixed and the patient is benefited by the cessation of symptoms and the rapid arrest of the disease. This also holds true in the application of the bone-graft to fix the diseased vertebræ of the spine.

The spine is anatomically well constructed for this method. We are able, by placing the bone-graft in the tips of the spinous processes of the diseased vertebræ and one or two normal ones, above and below, to make use of the full length of the spinous processes as levers over the transverse processes as fulcra, and thus hold that segment of the spine in hyperextension. This prevents motion at and crushing of the diseased vertebral bodies, both by leverage action of the spinous processes and splint action of the graft, and the field of operation is superficial, posterior to the spinal cord, and distal to the focus of disease.

CASE I

HISTORY.—Patient, a male, aged six, was brought to hospital because of a deformity to spine. The patient is very weak, frail, and anemic, extremely slender, and appears markedly tubercular. The entire chest is deformed, due to a long-standing kyphosis opposite the seventh to twelfth dorsal vertebræ. There is a marked dorsal curvature, producing quite a prominent lump over the tenth dorsal spine. The skin appears reddened and is very tender to touch. There is no associated scoliosis. Associated with the deformity there is a moderate degree of muscular rigidity which limits the bending movements at the back. The parts are painful to palpation, especially in and around the ky-

phosis. There is no associated paraplegia or evidence of any abscess formation.

Past History.—Has had none of the diseases of childhood. Never had a large appetite. Has never had toothache.

Family History.—Father and mother both living and well. Has two brothers and two sisters, all living and well.

OPERATION.—I am making the skin incision, beginning at the midline above, swerving to one side, and then back to the midline below the diseased area. This circular flap I will dissect up to expose the spinous processes with their supraspinous ligament, which I now split directly over the tips of the spines. The scalpel often tends to slip to one side, but this has to be prevented. I believe it better to make the curved skin incision to the side, as subsequent pressure and infected sutures would not come over the wound, and also better protection afforded the graft.

With the scalpel I split the supraspinous ligament at the same time that I split the interspinous ligaments between the tips of the spinous processes. Notice I am not separating them from their attachments to the spines. I am splitting them *en masse*. With the chisel I am now splitting the spinous processes themselves, and am breaking the halves at the bottom of the incision on this side, being careful not to fracture the half on the opposite side.

In splitting the spines we are guided by the sound of mallet and chisel as we approach the neural arch, which has proved to be a safe guide to prevent the chisel from penetrating too deeply. I have never had the misfortune to enter the neural canal

VISITING DOCTOR: You will not be able to correct that deformity to the full extent?

DR. ALBEE: No; it is a kyphosis of too long duration.

DR. PORTER: It is three years since the trouble first started.

DR. ALBEE: On account of the nature of this curve, we will have to bend the graft in putting it in. I would rather have put it in without bending it. I would like to call your attention to the motion between the vertebræ making up the kyphosis: I think I can see motion right there in the center of that kyphosis, and in view of this motion it is evident that if we put in a bone-

graft as a splint and fix it in the spines under lateral tension, a certain amount of kyphotic recession will result. We take a measure with this flexible probe of how long the graft is to be, in order to span the diseased vertebræ and one normal vertebra above and below. Now we outline on the exposed tibia what is to be the transplant, by incising deeply the periosteum where the saw is to travel. We will have the saline solution drip on the saw to keep it from heating. With the motor saw we remove a splint of bone from the crest of the tibia with a cross-section, thus [indicating].

VISITING DOCTOR: Do you leave the periosteum on your graft?

DR. ALBEE: Always, and some marrow tissue also. In my

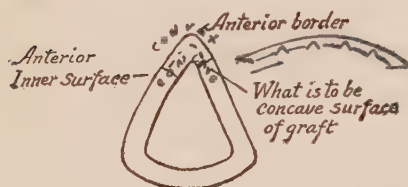


Fig. 94.—Diagram showing manner of taking the graft from the crest of the tibia.

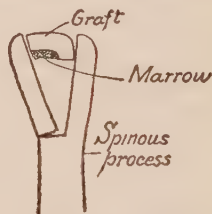


Fig. 95.—Diagram showing graft in place. It is held there by the supraspinous and interspinous ligaments being pulled over it posteriorly by the kangaroo-tendon sutures.

dog experiments, as I said last evening, I have used a large number of grafts without the periosteum, and these grafts seemed to do equally well as did those with the periosteum, but as the question about the permanency of the graft without the periosteum has been raised, I always include the periosteum when operating.

We will have to bend this graft in. It will be impossible to get the graft wide enough to mold it into the segment of a circle. Now we will have the saline solution drip on the saw.

With the graft held in two broad ligament clamps we are making with the motor saw notches one-half to two-thirds the way through the splint, on what is to be its concave side (see drawing). We are imitating the carpenter in this matter, as

he does precisely this when he wishes to bend a board around a corner. We have no trouble in bending children's bones under these conditions.

Now we will cut off the tips of the graft slantingly, so as to leave no sharp corners to project under the skin. I will incise the periosteum on the graft obliquely, so as to improve the blood-supply to the graft, and let out those active osteogenetic cells from the periphery of the bone-cortex.

Kangaroo tendon (medium) is a good suture for this work, because it is very strong. You need something hard and strong, because when I get down to this end, there is considerable tension, and catgut breaks. See! there is a good deal of tension in the center.

I think that we can expect some correction, because we found motion as the child breathed. We did not need the leverage of these two middle processes at all—just the leverage of the spinous processes on the side. Therefore we have cut off their tips with bone forceps, so as to diminish the kyphosis still further.

The next case is not very much deformed, and I will demonstrate putting in the graft in another way. We will put it in on the edge. It will have more strength if put in on the edge.

[Sutures, applies dressing and adhesive straps to hold dressing.]

In a case where the kyphosis is marked it is most important to build up about the knuckle with gauze or cotton pads, so as to prevent pressure on the tip of the kyphosis, because of the danger of a pressure-sore.

VISITING DOCTOR: What is the after-treatment?

DR. ALBEE: Keep them on a gas-pipe frame or mattress with board under it (fracture-bed) for six to ten weeks.

VISITING DOCTOR: Do you put on a cast?

DR. ALBEE: I have not used a cast on a single case: I rely on the graft.

VISITING DOCTOR: Do adults find the board hard to lie on?

DR. ALBEE: In our older cases we use a mattress with a board under it entirely. In one case of an adult where I used a frame the patient developed a pressure-sore over and down to the

graft, but it healed in completely and the graft is as good as ever. The knuckle was very sharp in this case.

VISITING DOCTOR: Do you keep them on their backs on that mattress?

DR. ALBEE: Yes, from six to eight weeks.

VISITING DOCTOR: Do you suppose that getting the patient on the bed-pan ever injures the graft?

DR. ALBEE: No. I have a very thin bed-pan used, but we are planning to get a sectional bed and thus be able to take out a section of it, instead of raising the patient.

A point about the technic where the child has been wearing a plaster jacket: A plaster jacket produces a pressure atrophy of the spinous processes in the tip of the kyphosis in nearly all these cases. In these cases the graft is very necessary if a bony bridge is to be produced by operative procedure, because of the small amount of bone present and the shortness of the spinous processes. Also we would caution against going too deeply with the chisel, and thus entering the spinal canal.

VISITING DOCTOR: What has been your experience with grafts of other species?

DR. ALBEE: Experiments have been done in which grafts of sheep's bone were inserted into dogs and they were all unsuccessful. I believe that if we are going to develop surgical procedure for human cases, we should use the most reliable methods and material, and I think an autogenous graft is the most reliable. I think grafts from other animals, dogs or sheep, are very unreliable. I have used successfully grafts taken from children strangulated at birth, which grafts have been kept in cold storage for forty-eight hours. I have also used a large part of the astragalus taken from a young adult, which was kept in cold storage twenty-four hours, to take the place of an absent head and neck of the femur in a child of four years. The graft was fastened to the stump of the neck of the femur by a dowel made from the tibia of another individual of about twenty-six years. The upper end of the femur in this case had been destroyed several months previously by an abscess; the acetabulum had remained undestroyed—hence the amount of motion. That case has been

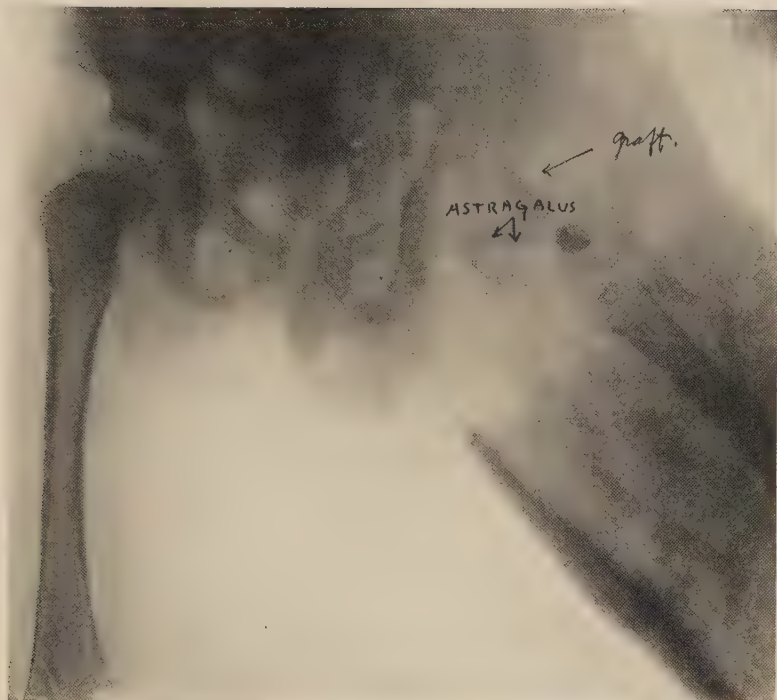


Fig. 96.—Child four years old. Destruction of head and neck of femur by septic arthritis several months before. Transplantation of two-thirds of astragalus of a young woman of eighteen years to take place of absent bone. This was fixed to upper end of femur by dowel made from piece of tibia of a person of twenty-six years.



Fig. 97.—Photographs before and after a bone transplant wedge was placed into scaphoid, after splitting it into anterior and posterior halves. The graft was obtained from upper end of the tibia of the other leg.

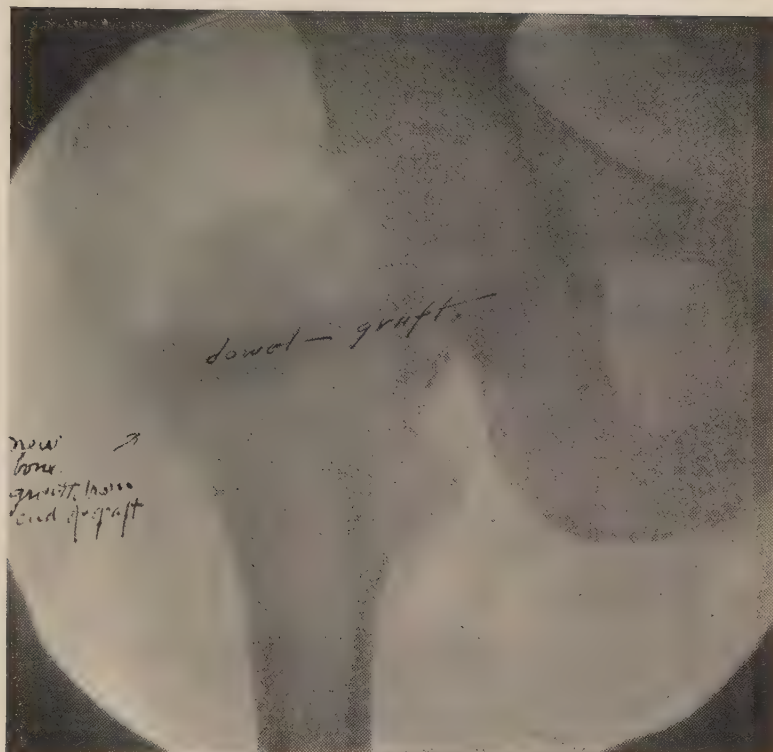


Fig. 98.—X-ray taken five weeks after operation. Case of ununited fracture of neck of femur of three and one-half months' duration, in woman of sixty years. In five weeks there was firm union. The most interesting feature about this x-ray is the large growth of bone from the external end of the graft itself, demonstrating the early bone-forming ability of the bone graft. After freshening the ends of the fragments, a hole the size of one's forefinger in diameter was made by a motor-driven drill through the outside of trochanter, through neck and head. Into this a dowel-shaped graft from the patient's tibia was driven with considerable force into place.

a most satisfactory one. The child has from one-half to two-thirds of the normal motion at the hip. These grafts are kept in cold storage at a temperature of 5° or 6° C. in sterile vaselin. Five or 6° C. is the best temperature, because the bone is damaged more by contraction and expansion if kept at a lower temperature.

We put in a bone-graft in a case of wrist-drop which has been very successful. It resulted from a paralysis. The child was six or seven years old, and every time she tried to use the arm the wrist dropped because of a paralysis of the extensor tendons. She was quite a talented young child, and tried to pick out notes on the piano. Her parents were very anxious that she should use the arm, and consulted me. The graft had never before, as far as I know, been used for that purpose, but I suggested trying it. They concurred. We put in a graft taken from the tibia of the same patient, and inserted it into the side of the radius, about two inches from the articulation of the wrist, and fixed it to the trapezium and trapezoid bones and to the ligaments. The result is most gratifying. Now, of course, we can do something for a case of this kind by applying a brace, but it would always interfere with the use of the hand.

We have also used similar procedure for paralytic conditions of the peroneal muscles in older children, where the foot is held markedly in an adducted position. A wedge-shaped piece of bone is placed between the astragalus and the scaphoid after the cartilage had been removed from each of these bones. In this way the foot is held in the corrected position. For congenital club-foot we split the scaphoid vertically and put the wedge-shaped graft in between. This is done in children over three years of age only.

CASE II

HISTORY.—Patient, a female, aged six, brought to hospital for correction of a long-standing Pott's disease. Parents state that since the child was one year old she has always had a swelling over the middle of the dorsal spine. Condition has been

gradually getting worse during the last five years. Complains of pain and tenderness over back.

Physical Findings.—Healthy appearing child, well, seems to be developed in every way. Dorsal curvature of moderate degree, involving the tenth to twelfth dorsal vertebræ. Slight pain and tenderness over back. Past and family history negative.

DR. ALBEE: Now, again, I split the spinous processes. Here is a child lying on this firm operating table, and remember that she is breathing a little more forcibly than normal, and there is all that motion between the vertebræ of the kyphosis. See how much we can increase the motion by moderate pressure over the kyphosis.

In this case the spinous processes are very much shortened from the jacket which the child has been wearing. I cannot go in there as deeply as I would like to, on account of shortened spinous processes, so I will have to bend this graft.

[Takes piece from tibia with motor saw and saws notches into graft by precisely the same technic as in first case.]

I find it well in adults, where we do not wish the graft to grow in length, to incise the periosteum longitudinally. In the case of children, where we want the graft to grow, we incise it cross-wise, following Macewen's teaching, that the periosteum is a limiting membrane. Now you see that graft goes in very nicely. We have not used many hemostats. There is very little bleeding, and this is the usual experience. We have not cut any vascular structures.

VISITING DOCTOR: Do the grafts ever break?

DR. ALBEE: This is my one hundred and eighth case; if this does not break, I will have had only one in that number that broke. That case was an adult, a medical student. The result has not been interfered with thus far, as he declares that the pain disappeared when he went under the ether and has not returned since the operation. The periosteum was not torn where the graft broke.

You notice the large amount of motion right in the center of the kyphosis in a case of this duration. Here is a case of five years' duration. There is motion in the center of that kyphosis

each time the child breathes. I never noticed that amount of motion in my first cases. (We have not tied a bleeding vessel during the whole operation.) (We have a very good hemostasis.)

VISITING DOCTOR: How soon do you remove those dressings?

DR. ALBEE: After eight or ten days.

VISITING DOCTOR: Do you ever use the gas-pipe frame?

DR. ALBEE: We generally use a fracture-bed (board under mattress), sometimes a gas-pipe or Bradford frame. The trouble with the gas-pipe frame is that the children are uncomfortable. Take a kyphosis like this: it is rather difficult to pad that so as to prevent considerable pressure on tip of kyphosis, and too much pressure might produce a pressure-sore. That is why I believe in using the fracture-bed. I keep them on their backs for six or ten weeks. I keep some of them in the hospital for three weeks, and then send them home on a frame.

PROCIDENTIA UTERI

Dr. Murphy's Method of Fixing the Uterus

HISTORY

PATIENT, female, married, aged fifty-six, enters hospital on account of prolapse of the uterus and a constant uterine discharge. Trouble dates back to thirty-three years ago, when her first child was born. It was a hard labor and she was badly torn. Two months later she noticed a mass coming down in her vagina. It was much worse after being on her feet a great deal or after straining at stool. Three years later her second child was born, and two years after this a third child was born. Neither of these pregnancies seemed to affect her trouble one way or another. In 1890 she was told that she had several ulcers on the cervix. They caused her much pain, and occasionally there was a slight vaginal discharge. They were treated by medication and healed. Her condition now remained about the same—no pain and no other symptoms unless she was on her feet a great deal. Her bowels, however, were very constipated. In 1905, after taking care of a sick person for six weeks and doing much lifting, her trouble began to get worse, and it has progressed steadily until the past few months, when it has grown worse rapidly. Now the uterus protrudes from the vulva three or four inches when she is on her feet. During the past three months she has had a dull aching pain through the pelvis and back. Occasionally she has slight difficulty in passing urine. Bowels have not been so constipated during the past seven years as previously. Since September 1, 1912 (five months ago), she has had a continuous vaginal discharge. It is bloody most of the time, with not much odor. It varies slightly in amount, but is always constant, requiring two or three napkins a day. Menopause three years

ago. Menstrual history negative. Past history is negative except for periodic attacks of diarrhea about seven years ago lasting for five years.

COMMENTS AND OPERATION

DR. MURPHY: Several factors must be considered in the evolution of this condition. There is, first, the retroversion. Procidentia cannot occur until there is a retroversion; second, the increased intra-abdominal pressure on the anterior surface of the uterus when in the retroverted position presses the organ down until the perineum gives way, and the tampon pressure of the cervix and the wedge-shaped enlargement of the uterus do the rest; third, this state of affairs continues, getting a little worse all the time, until the patient makes a supreme exertion, and then the uterus appears at the vulva. In these cases the question arises whether one should do a hysterectomy or a ventral fixation in the manner suggested by Kelly for retroversion. This is always a good operation if it is done early, in the retroversion stage of the procidentia, thus avoiding the procidentia by putting the uterus in a position where it does not retrovert. Now, however, we must do something that will lift up the whole floor of the pelvis and hold it up permanently. If one could close up the vagina completely, approximating the levator muscles, leaving no opening, then the perineal operation would do very well, because it would throw all the intrapelvic weight on the perineal muscles, but you cannot do that in these young women with marital relations. Next you can do a supra-vaginal amputation and bring the broad ligaments across the stump of the cervix to hold up the vagina. After that commences to stretch, out come the rectum and the bladder, and the patient is worse off than before.

In these cases we have worked out a plan that has so far been entirely satisfactory. If we see the case in the early stage, we do a ventral implantation; that is, we implant the fundus of the uterus between the divided aponeuroses of the abdominal rectus muscles and unite it to the rectus muscle so that it becomes fixed there. We divide the tubes from the uterus, taking them



Fig. 99.—The Murphy operation for procidentia of the uterus. First step. The drawing shows the line (A-B) of the transverse semilunar incision, six inches in length, and about one inch above the symphysis pubis (Bryant and Buck, "American Practice of Surgery").

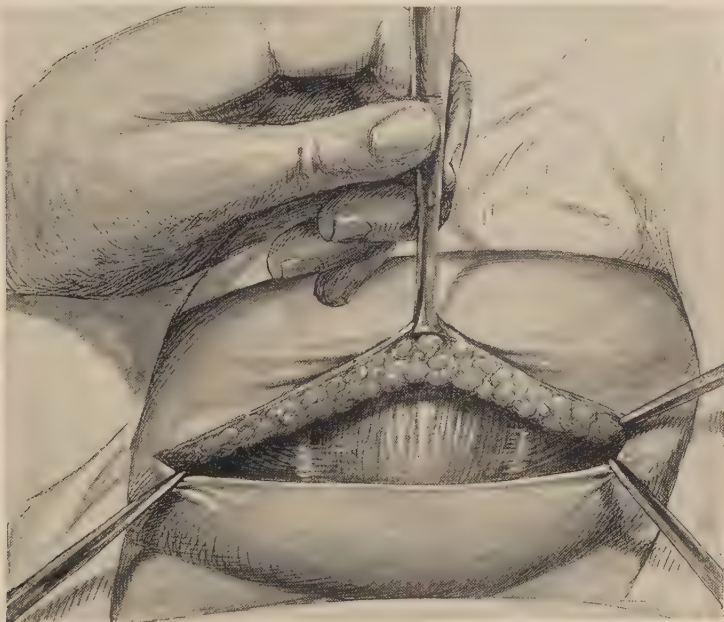


Fig. 100.—Second step. The drawing shows the skin and fat divided down to the aponeurosis of the recti. The upper flap is retracted. The fibers of the rectus muscle are visible (Bryant and Buck, "American Practice of Surgery").

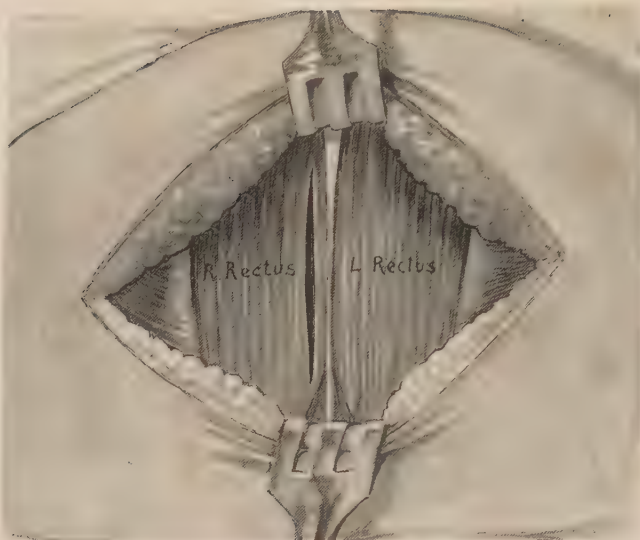


Fig. 101.—Third step. The drawing shows the line of incision in the right rectus muscle and peritoneum underneath (Bryant and Buck, "American Practice of Surgery").



Fig. 102.—Fourth step. The drawing shows the abdomen opened and the uterus drawn out of the abdominal cavity and divested of the broad ligament on both sides down to its junction with the cervix. The lateral sutures have been placed (Bryant and Buck, "American Practice of Surgery").

off at the cornua, displace the broad ligament downward, and bring the fundus of the uterus above the anterior surface of the rectus muscle. If it is a superlative degree case, you can place more of the uterus outside of the peritoneal cavity. Often you can put the whole uterine body outside and make an anterior extravental implantation—that is, you can draw the uterus up through the anterior abdominal wall, then split it anteroposteriorly into halves, take out the mucous membrane entirely, from the cornua to the cervicocorporeal junction. Then lay these two parts of the uterus, serous surface forward, on the rectus muscle sheaths, like the two wings of a bat, and suture them in with catgut. That holds up the floor of the pelvis for all time. You can do that operation practically extraperitoneally except the lifting of the uterus into the abdominal incision.

The technic of this operation, which was described by me originally in Bryant and Buck's "Surgery," is as follows:

The patient is placed in the Trendelenburg position. A transverse semilunar incision is made one inch above the symphysis and measuring six inches. The tissues should be divided down to the aponeuroses of the recti; the latter should be freed from fat over an area one inch wide for the full length of the incision, and the edges retracted. The right rectus is then incised for two inches close to the median line and parallel to its long axis. This incision is extended through the peritoneum. The uterine fundus is then grasped with a vulsella and brought out through the opening until the cervicocorporeal portion is clearly in view. The round and broad ligaments are then clamped with hemostats on either side down to the cervicocorporeal junction and cut free from the uterus down to the tip of the forceps. The stumps are ligated, and the tips sewed accurately to the cervicocorporeal junction, and this portion is slipped back into the abdominal cavity, thus leaving the body of the uterus bare and free, standing above the level of the divided recti.

The peritoneum is next sutured accurately around and to the circumference of the cervicocorporeal portion of the uterus, thus closing the peritoneal cavity. The uterus is then split

through the middle from before backward parallel to the long axis of the body down to the cervicocorporeal junction. It is opened out laterally, thus forming two wings. The mucosa is next cut off clear out through the divided cornua down to the cervix and removed. The two lateral flanges of uterine muscularis are then sewed firmly to the aponeurosis of the rectus all the way around, making a bat-like flange over the recti. Finally the divided edge of the aponeurosis of the rectus is tightly closed around the cervicocorporal portion of the uterus. The skin and fatty tissue are united, a small drain being left at the lower angle of the wound. The uterus can never again get back into the abdomen. The traction on the anterior vaginal wall holds the bladder in position, and the posterior vaginal wall, the rectum.

The only intra-abdominal work is the detachment of the broad ligaments. The stumps of these are covered by suturing, so that no abraded surface is left within the peritoneum at the completion of the operation. If the operation is performed before the menopause, great care should be exercised in removing all the uterine mucosa, as otherwise periodic hematomata will form at the menstrual periods. The operation can be done in twenty minutes by trained hands.

In recent times the employment of pessaries in the treatment of advanced prolapse has been superseded by operative measures, for the reason that the condition does not permit of spontaneous recovery, but tends to become aggravated with advancing years. Moreover, treatment by mechanical means, as by pessaries or tampons, is in no sense curative; it depends upon putting the vaginal tissue upon the stretch and thus supporting the uterus. It is safe, therefore, to assume that, after a number of years of such treatment, many cases will outlive the usefulness of the method. Surgical interference, on the contrary, is curative and is attended with comparatively little risk in the hands of skilled men, even though the patient be well advanced in years. Trained men frequently operate without anesthesia, or under local anesthesia, thus avoiding the risk of a general anesthetic.

Operative treatment is divided into two classes, conservative

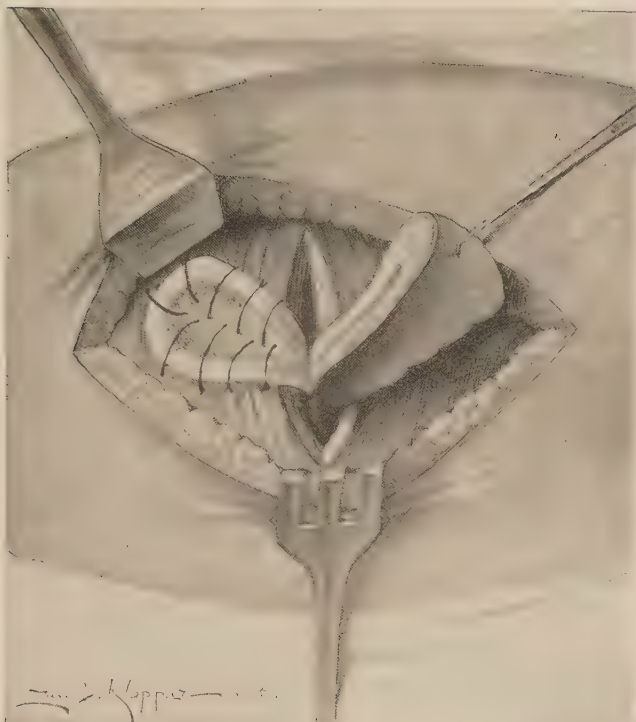


Fig. 103.—Fifth step. The drawing shows the right half of the divided uterus sutured on the anterior surface of the right rectus muscle, the left half being ready for suturing. The uterine cavity surface, which has been divested of its mucosa, is uppermost. The cervix is in the peritoneal cavity (Bryant and Buck, "American Practice of Surgery").

and radical, according as the uterus is allowed to remain or is removed. Conservative operations are applicable generally in cases of incomplete prolapse, while the radical procedures are usually reserved for complete procidentias, unless there is some indication for extirpation, such as is afforded by ulceration, etc. Both operations are supplemented by procedures which restore the pelvic floor and narrow the lumen of the vagina.

The operative treatment which up to recent times had enjoyed the greatest vogue consists in fixing the uterus to the abdominal wall after a preliminary curetage, amputation of the cervix, and ablation of the anterior and posterior vaginal walls with colporrhaphy. As we have already indicated, fixation of the uterus should not be done upon a woman capable of becoming pregnant. Therefore, as a preliminary step in the operation on women who have not passed the menopause the tubes should either be resected or a wedge-shaped portion should be removed. If this is not done, and if sutures are tied about the tubes, the lumen of the tubes may later be restored and pregnancy result. Therefore if the tubes are to remain, a wedge-shaped area should be removed from the cornua and the gap should be closed over by plastic sutures; the ligated end of the tube should be buried in the broad ligament.

The study of chronic cases has shown that the method of fixing the uterus, as performed in this country up to fifteen years ago, does not lead to good results. The fixation, as a rule, is not firm, and there is formed a suspensory ligament which later elongates. It is better, if this method is decided upon, to make upon the fundus a raw area several centimeters in diameter, and around the edge of this denuded area to fix the peritoneum with a continuous suture of catgut. Then, in closing the recti muscles, seize the scarified top of the uterus in the intermuscular suture, so that the fundus shall be firmly attached to the recti muscle. It must be admitted, however, that the remote results of this method in unselected cases are not so satisfactory as to make it the operation of choice for cases of complete prolapse. Not infrequently the operator finds, some years after the opera-

tion, that, although the uterus is well held up, the bladder is again prolapsed.

Now, I have made the Pfannenstiel incision. The aponeurosis of the rectus muscles is exposed. Next I will divide this aponeurosis and retract the muscle-fibers, without injuring or dividing them. The peritoneum is now in view, and will be picked up with two tissue forceps and divided on the incline between them. This woman is just getting the incontinence which is one of the disagreeable symptoms of the procidentia. If the uterus has been drawn down in the pelvis for a time, the bladder sags and the patient has incontinence. I can pick up the uterus easily. It comes up into the field nicely. The next thing to do is to free the attachment of the broad ligament to the cervicocorporeal junction, on both sides, and ligate the uterine arteries. We are not going to take out both ovaries, only one,—the left,—because it is senile and fibrosed. After the uterus is freed I can draw it out of the abdominal cavity. I am going to split that uterus anteroposteriorly into two equal parts. The next thing is to split that peritoneum. You see all this work has been done practically outside of the peritoneum. I am going to fix that broad-ligament stump to the cervix, so that it will be fixed there and not drop down into the peritoneal cavity and form adhesions. The next thing is to suture the peritoneum around the cervix so as to close the peritoneal cavity. That leaves the body of the uterus outside of the abdominal cavity.

The rest of the work is extraperitoneal. The next step is to approximate the cut edges of the aponeurosis of the rectus muscle around the uterus, just the same as I closed the peritoneum. We leave the uterus on the outside.

Next I split the uterus and dissect out its mucosa entirely. It is senile and dry; it scarcely bleeds at all.

Then we turn each half of the uterus outward and place the serous surface in contact with the aponeurosis of the rectus, suturing it to the aponeurosis with catgut. The uterus is now spread out on the rectus muscle like a bat with wings spread. The uterus is outside of the peritoneum all the time. One can scarcely conceive of a more simple operation. When the patient

has not passed the menopause, we do the same operation, but we never remove the ovaries in those cases. In patients past the menopause this is the ideal operation. Women who have a procidentia of this degree never have children, and in those cases the operation is also indicated. It is not difficult to do. I think it is about five years since I did the first operation of this kind. If the bladder comes down, we will do an anterior colporrhaphy to correct the cystocele or bladder descensus. We have not had to do that operation in a single case up to this time. A small gutta-percha drain will be put in and the wound closed in the usual way. [The patient made an uneventful recovery.—ED.]

CHOLECYSTITIS: SYMPTOMATIC DIABETES MELLITUS DUE TO GALL-BLADDER INFECTION

DISCUSSION OF MEDICAL PHASE BY DR. C. L. MIX

HISTORY

PATIENT, a female, married, age forty-three, enters the hospital because of epigastric pain and general weakness.

In July, 1912, the patient was in bed for four weeks with gaseous distention of the abdomen; she could eat scarcely anything on account of a burning sensation in the epigastrium, immediately following eating, and later great distention. She had a dull pain over the whole epigastrium, she thinks due to pressure. She had no nausea or vomiting. She had "cramp-like" pains over the abdomen which came and went with no regularity. She also had an alternating diarrhea and constipation. A doctor whom she consulted told her she had diabetes.

Previous to this, for about four years, she had great thirst and a keen appetite, with very frequent urination and a severe pruritus around the genitalia. She got up after four weeks and was very weak for some time. She lived on a diet during the whole summer of 1912, and felt very well. Last fall, when the cold weather started, she began to have pains in the epigastrium and both hypochondriac regions. These pains grew worse after taking either solid or liquid food, within ten minutes after eating. The pain was raw and dull, remained for four or five hours, and only when she began to feel hungry did the pain disappear. She never vomits or is nauseated. She complains of the worst pain in the middle of the epigastrium. There is some pain under both ribs—no more on one side than the other. She never has had a sudden acute pain in the side. Her abdomen is tender in

the midline and under both costal arches. The pain used to radiate through to the back, but never to the right shoulder-blade. Formerly she had a great deal of pain over various sections of the body—head, face, and limbs. She has been in her present condition since last November, and is gradually getting weaker.

Menstrual history: She is always slightly irregular, flows three days, and has no pain. She has six children, the youngest ten years.

COMMENTS AND OPERATION

DR. MURPHY: Dr. Mix, will you kindly discuss the medical history of this case?

DR. MIX: You have just heard the history which has been given by the intern.

This patient first consulted a physician early in July, 1912. At that time she had lost some 30 pounds in weight, though no mention is made of it in the intern's history. The physician who made the examination found, evidently, a large amount of sugar in the urine and stopped with the diagnosis of diabetes. Diabetes is not found to be associated with a burning sensation in the epigastrium and gaseous distention. Though capable of explaining very satisfactorily the general weakness and the various pains, which are mentioned in the history as formerly existing in various sections of the body, head, face, and limbs, diabetes does not suffice to explain the burning sensation and dull pain in the epigastrium. It was these symptoms which attracted our attention to the patient and for which she is this morning to be operated on.

On entrance the blood examination which was made immediately showed 75 per cent. hemoglobin and 8400 white blood-corpuscles; examination of the urine made the same day showed no albumin, no casts. Sugar was present and a few white blood-cells. The specific gravity of a single specimen sent up to the laboratory was 1027—amount, 120 c.c. A twenty-four-hour specimen collected the next day showed a specific gravity of 1035. I kept her under rather careful observation from her entrance on

the fourth of February until the ninth, upon which day I found that she showed a temperature of 99° F. at 6 A. M.; at 3 P. M. a temperature of 99.4° F. On the tenth she had a temperature of 98.8° F. at 3 P. M. A blood examination made on the ninth, the day on which she showed a slight amount of fever, gave a leukocyte count of 11,800, indicating some slight infection. The following day, when the temperature had fallen to 98.8° F., the blood examination showed 8200 leukocytes. From this I felt confirmed in the opinion that some infectious process was located somewhere in the body, and was probably associated with the epigastric pain of which she complained.

The examination of the urine made yesterday showed a specific gravity of 1043, and that reported this morning shows a specific gravity of 1040, with a percentage of sugar of 6.9. As to the diagnosis of diabetes, therefore, in this case there is absolutely no question; in looking over the history you will recall that for four years she had been troubled with a great thirst and appetite, frequent urination, and severe pruritus around the genitalia.

In July, 1912, there is a definite history of some abdominal disturbance. She was in bed for four weeks with a loss of appetite and a burning sensation in the epigastrium, together with dull pain, gaseous distention, some alternating diarrhea and constipation. At this time there was no nausea or vomiting. She also believes that during July, 1912, she had fever. After remaining in bed for four weeks she recovered sufficiently to get up and go about her work, but in the fall of the year, with the onset of cold weather, she again became troubled with pain in the epigastrium and under the edges of both the right and left ribs. Both in July and in the fall she said that the pain was quite severe in both hypochondriac regions.

At the onset of cold weather she began to notice some relationship between food and pain. The pain became worse about ten minutes after eating, was raw and dull, lasted four to five hours, and usually did not disappear until she began to feel a sensation of hunger for the next meal. To me she complained of an additional symptom which she described as cramps in the abdomen when she walked, but I found on cross-examination

that she meant merely by the word cramp a pain. She never was jaundiced; she never had a chill; she never had any pain in the right iliac fossa.

Physical examination shows tenderness in the midline and under the right costal border. The amount of tenderness on deep pressure was rather considerable, and suggests gall-bladder disease. Feeling that there might possibly be a gall-bladder infection from typhoid germs, though there was no typhoid fever mentioned in her life history, I ordered a Widal reaction, which proved to be negative.

The history of the case might suggest a duodenal ulcer or an infected gall-bladder. Examinations of the feces for blood were made three times, and in each case the report was negative. Evidently if there is an ulcer in the duodenum it is at the present time quiescent. The pain which was mentioned as occurring within ten minutes after eating is not at all suggestive of a duodenal ulcer. We have been accustomed to find individuals with duodenal ulcer complaining of pain from one to three hours or more after meals, and continuing until the next meal has been eaten. In the present case we note the occurrence of pain ten minutes after meals, and its disappearance, not when the patient had eaten, but when the patient began to feel the natural appetite for the succeeding meal. Such a pain might perhaps be associated with gastric ulcer, but only in the event that food retention was present for several hours after a meal. Examination of the patient's food progress through the stomach showed no delay whatever, and a normal stomach digestion with normal acidity.

On the other hand, the symptomatology is fairly well explained by the diagnosis of a cholecystitis. There has never been a history of gall-bladder colic or biliary blockade. The history is rather that of an inflamed and infected gall-bladder in which the infection is of a mild type but capable at times of exacerbations, one of which occurred in July, 1912, and another at the onset of cold weather, and a third in February while in the hospital, as has already been stated, when she developed a slight temperature and an increase in the leukocytes. With the

fall of the temperature there was a fall of the leukocytosis. The absence of nausea and vomiting is a symptom common to duodenal ulcer, cholecystitis, and pericholecystitis, though vomiting is, of course, frequent in the two latter conditions. It, therefore, gives us no help in the diagnosis. The epigastric pain, which she describes as dull and raw, is not characteristic of peptic ulcer or duodenal ulcer. It is rather more apt to occur in pericholecystitis cases.

Another very important symptom in the case is the glycosuria. We are beginning to learn, with an increased operative experience, that most cases of glycosuria after the age of forty are due to gross disease of the pancreas. Actual statistics show that 97 per cent. of such cases of glycosuria are due to pancreatic disease. Now there is a close relationship between the pancreas and liver or rather between infections of the liver primarily and infections of the pancreas secondarily.

Some years ago Dr. Ohlmacher, then Professor of Pathology at Northwestern University Medical School, noted the presence of cirrhotic pancreas in every case of hepatic cirrhosis which came to postmortem examination. He was early convinced that the same etiologic factor was the cause of the development of the interstitial processes in both the liver and the pancreas. Some operators have also discovered that after drainage of the gall-bladder mild cases of glycosuria have cleared up. We believe that in this case the diagnosis of cholecystitis is very much supported by the presence of the glycosuria. We are of the opinion, therefore, that this gall-bladder should be opened and drained and that the drainage is going to reduce materially, if not absolutely cure, the diabetes. We do not believe it to be utopian to hope that long-continued drainage will cure the case. We admit that the amount of sugar which she is showing, very nearly 7 per cent., is high and possibly nearly hopeless, but there is nothing to be gained by long-continued diet or any other form of treatment for diabetes. The patient is Jewish, and the odds are the stronger against us, perhaps, on that account. Nevertheless, I have strongly advised the patient, who came into my service, of the need for this operation and the possibilities for cure

which it carries with it, and Dr. Murphy, who very kindly saw her with me, has concurred in the diagnosis and in the suggestion that the gall-bladder be opened and drained.

DR. MURPHY: We had the opportunity, two or three weeks ago, to show some of these cases where the patient had been relieved completely by drainage. One of these patients, a doctor, gained 34 pounds in sixty-seven days with simple drainage of the gall-bladder. He had an arthritis, with signs of metastases. They all disappeared with the drainage. Cultures of the gall-bladder contents were not successful.

We will expose the gall-bladder by opening the abdomen through the rectus muscle. She has a white gall-bladder, which is very common. This condition of the gall-bladder is a most important sign—a white gall-bladder with fixed adhesions, showing that she has not only had a cholecystitis, but a pericholecystitis. It is an organic adhesion following an infection.

Now we will bring the pyloric zone of the stomach and the duodenum into the field. There is no adhesion on the duodenum. Looking at the anterior surface of the duodenum, it appears to be normal. There is no evidence of ulceration. The next step is to examine the posterior surface of the duodenum. There is a nodule in the head of the pancreas in the region of the duct. That nodule extends back for fully one inch. This shows that she had a chronic infection of the gall-bladder. All that is pathologic. See the infiltration! a typical illustration of a chronic infection. That probably accounts for the lesion in the pancreas. It is a most beautiful demonstration of a pathologic condition. The pancreas is small, but woody hard. It is an infection of the pancreas which occurred from the infection of the gall-bladder. I want to feel the under surface of the pancreas to see that there is no stone in the pancreatic duct. No stone is palpable in the duct.

Now, then, we will examine the gall-bladder and see if there are stones palpable in the gall-bladder. After freeing the adhesions the gall-bladder is compressible. There are no stones in it, nor in the cystic or common ducts. We will drain the gall-bladder. The drainage will have to be kept up for a long time.

This is fine. There is the reward. We find something pathologic—not only the gall-bladder, which we recognize, but an infection of the pancreas which we believe is secondary to the infection in the biliary passages. We believe it is not a direct infection. We believe that this condition in the biliary passages is typical, namely, as long as the outlet or inlet is free you have no trouble, but immediately an obstruction occurs trouble follows.

I was very much pleased with what Dr. Mix said about glycosuria, namely, that in a large percentage of the cases it is not a nervous system condition, but that it is of pancreatic origin—that it is a definite lesion involving the pancreas. I believe we are going to come to the surgical treatment of many cases of glycosuria. This drain in the gall-bladder will be kept in for weeks or possibly even months. We will aspirate the gall-bladder. It contains a thick bile, somewhat cloudy. Then we insert the two rows of puckering-string sutures in the dome of the gall-bladder, about one-half inch apart. The rubber drainage-tube is then passed into the gall-bladder and the upper suture is drawn taut. The tube is now pushed down into the gall-bladder, thus inverting it, and the lower suture is drawn taut. Now I am going to secure the tube in position with one stitch, the needle going clear through the tube, from side to side. That is made a part of the outer row of stitches. That makes it absolutely secure. The small needle puncture immediately closes itself. The gall-bladder is dropped back into the peritoneal cavity, and the tube is secured to the abdominal wound with a silkworm-gut stitch.

This is a splendid case because it shows a definite lesion. We think we are going to get results from the drainage. We will also put in a small peritoneal drain.

Let the record show that there was no evidence of ulcer of the stomach, no evidence of ulcer of the duodenum; that the source of the cholecystic infection is not definite; that she had a typical white gall-bladder, indicative of a chronic infection; that she had adhesions between the dome of the gall-bladder and the large intestine, but no adhesions to the duodenum. The abdomen is closed in the usual manner.

DR. MIX: March 28, 1913: The following supplementary report is made in regard to this case. She was operated on February 13th. A drainage-tube was inserted into the gall-bladder and the drainage has been as follows: February sixteenth, 120 c.c.; seventeenth, 310 c.c.; eighteenth, 100 c.c.; nineteenth, 90 c.c.; twentieth, 110 c.c.; twenty-first, 120 c.c.; twenty-second, 100 c.c.; twenty-third, 400 c.c.; twenty-fourth, 180 c.c.; twenty-fifth, 100 c.c.; twenty-sixth, 90 c.c.; twenty-seventh, 110 c.c.; twenty-eighth, 140 c.c.; March first, 120 c.c.; second, 120 c.c.; fourth, 360 c.c.; fifth, 200 c.c.; sixth, 180 c.c.; seventh, 200 c.c.; ninth, 90 c.c.; fifteenth, 90 c.c.; sixteenth, 120 c.c.

On the sixteenth the large drainage-tube was removed and a smaller one was inserted. The drainage thereafter was as follows: March seventeenth, 150 c.c.; eighteenth, 300 c.c.; nineteenth, 180 c.c.

Thereafter the drainage was no longer into a jar, but into the dressings. On the twenty-first the dressings were reported saturated. Since that time the drainage has been diminishing very rapidly. The smaller tube inserted on the sixteenth was removed on the twenty-sixth, since which time the dressings are practically dry, though there is a tiny bit of oozing which will probably cease within a day or two.

Our hopes in regard to the glycosuria have been reasonably well realized. The day after the operation, February 14th, the specific gravity of the urine was 1045; on the fifteenth, 1040; on the twentieth, 1040. A quantitative sugar analysis on the fifteenth gave the same percentage, 6.9, as had been observed before the operation. By the twenty-sixth, the thirteenth day after the operation, the specific gravity had fallen to 1025. On the twenty-eighth it was 1030; on March 2d it was 1030, and on this occasion, for the first time, sugar was absent from the urine. On the fourth it reappeared, the specific gravity being 1026 and the amount of sugar 0.4 per cent. On the fifth the specific gravity was 1018, and the sugar 0.6 per cent. On the seventh the specific gravity was 1031 in a single specimen and the percentage of sugar 1.2. On the tenth the specific gravity was 1025 and the percentage of sugar less than 0.5 per cent.

On the twelfth the specific gravity was 1021. Sugar was present, but no quantitative analysis was made. On the seventeenth the specific gravity was 1021 and sugar 1.4 per cent. On the eighteenth the specific gravity was 1020. Sugar was present, but no quantitative analysis was made. On the twenty-first the specific gravity was 1018 and the quantity of sugar 2.4 per cent. On the twenty-seventh the specific gravity was 1024, and the percentage of sugar less than 1. On March 9th the specific gravity was 1013 and no sugar was present. On March 31st the specific gravity was 1015, and it took 25 minims of urine to show a trace of sugar with Fehling's solution.

During the time which has elapsed since the operation we have not had the patient on a diet which has been very much restricted. The only thing about which we have been particular is the elimination of cane-sugar and fruit-sugar from the diet. She has, however, been permitted to have what starches she has wished. For example, at the noon meal today her diet included two soda crackers and a slice of bread. Notwithstanding this fact, she has assimilated the starches in very good shape. The abdominal pains have entirely disappeared, and she feels quite well. It is our intention to allow her to leave the hospital on Wednesday, April 2d.

CLINIC HELD BY DR. MURPHY AT MERCY HOSPITAL FOR THE CHICAGO SURGICAL SOCIETY, MARCH 1, 1913

[A demonstration of patients in the hospital and a discussion of cases previously operated, numbering, all told, 50. Many of the cases have already been published in the CLINICS, and from among the unpublished cases the following are selected for full presentation.]

DR. MURPHY: It is not my intention to do any operative work this morning. I will merely show you some of the patients operated on recently who are still in the hospital, and review some of the cases operated previously, so as to give you an idea of the work we are doing here.

CASE I.—TENOPLASTY FOR PARALYSIS FOLLOWING AN ANTERIOR POLIOMYELITIS

This patient had poliomyelitis sixteen years ago, when she was four years old. We cannot get a definite history of the original trouble, so that we were obliged to base our diagnosis on the rather meager history and the present condition of the patient. It appears that the girl was perfectly well in the afternoon, but that night she developed a fever and the following day she became delirious. When she regained consciousness two days later she had an almost complete paralysis of the right leg. When she came to the hospital the foot was inverted, and she was unable to evert it. She had power in the tendo Achillis, and to a slight degree in the tibialis anticus, showing that some of the nerve-fibers in the external and internal popliteal nerves were functioning. The peroneal group and the quadriceps group of muscles were completely paralyzed. All the extensors of the toes were active, particularly the extensor longus hallucis, which had taken on part of the function of the tibialis anticus.

We have had a number of these cases come to us in the past few years, and, therefore, we have been obliged to do some real orthopedic surgery in order to give these patients useful limbs. We are not putting mechanical supports on any of them after the tendons have become contracted and the limbs in a fixed position. This patient's foot was in extreme extension, and she walked on the outer edge of it—a talipes equinovagis. She had no power to flex it, because the tibialis anticus was paralyzed. You can see what a splendid foot she has now. It strikes the ground flat and carries her weight well, and in place of turning in, it is turning out—that is, there is abduction instead of adduction.

We have operated on her twice. At the first operation we split the tendo Achillis longitudinally for a distance of about two inches, and divided the outer portion, consisting of about one-third of the thickness of the tendon, transversely. The inner two-thirds was divided lower down. The foot was then flexed forcibly, and the cut ends of the tendon were carefully approximated and sutured with a rather heavy chromicized catgut. The subdermal tissues were sutured over the tendon with plain catgut and the skin with horsehair. That put the entire traction on the outer half of the tendon and on the outer half of the tuberosity of the os calcis instead of on the inner half, and allowed the heel to come down.

Next, the extensor longus hallucis was exposed at the ankle through a small incision and likewise over the head of the first metatarsal bone. It was freed and divided close to its attachment to the metatarsal bone. The distal end of the tendon was sutured to the side of the extensor brevis pollicis. The proximal end was drawn out through the ankle incision, passed beneath the skin, and attached to the fibrous tissue at the base of the fifth metatarsal bone, to bring the foot into eversion. The tendons were sutured with catgut. The skin wounds were close with horsehair only.

Next the tibialis anticus was exposed and split into two parts longitudinally; one segment was divided transversely. The proximal end of this portion of the tendon was sutured into the



Fig. 104.



Fig. 105.

Figs. 104 and 105.—Case I: Tenoplasty for paralysis following an anterior poliomyelitis. Fig. 104, position of foot before operation. The leg is very much smaller than its fellow; the foot is turned outward; the knee is below the fellow knee, because it is flexed, as can be seen in the lateral view (Fig. 105).



Fig. 106.

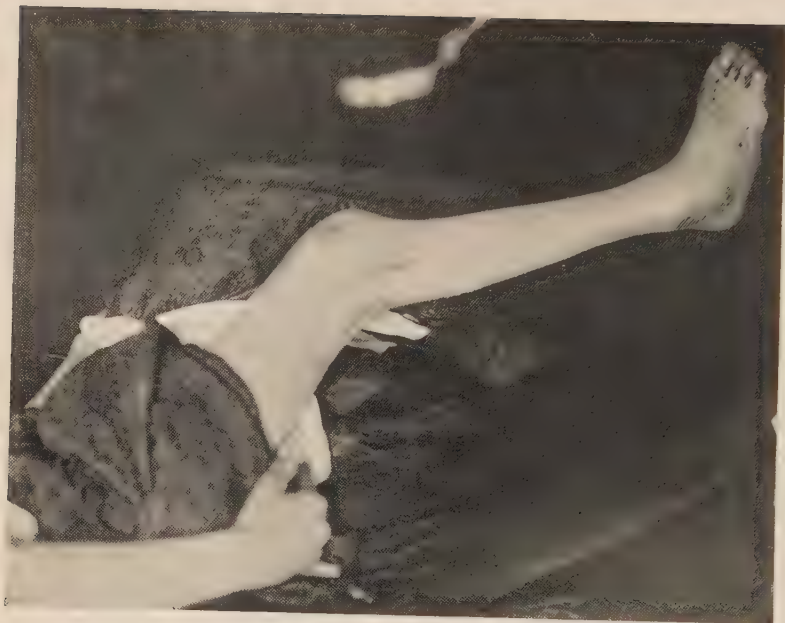


Fig. 107.

Figs. 106 and 107.— Tenoplasty for paralysis following an anterior poliomyelitis. Position of leg after operation. Foot is placed squarely on the ground and there is no inversion.

transplanted tendon of the extensor hallucis, so as to get the double effect of both muscles as everters and flexors. Then, with the tenotome, we divided the plantar fascia subcutaneously. The tibiocalcaneus ligament was exposed by an incision over the internal malleolus and shortened by reefing it. With the aid of a Jones wrench, which should be in every operating-room, the foot was manipulated until it was as flat as we wanted it. A light plaster cast was applied with the foot flat and at right angles.

The patient made an uneventful recovery, and before she left the hospital she was fitted with a shoe which would hold the foot in the proper position.

There remained a complete paralysis of the quadriceps muscle group and of the sartorius, which is supplied from the same motor center in the cord as are the quadriceps muscles—through the anterior crural. The biceps was intact. A second operation was performed later, with the idea of giving the patient a useful knee. She had no power of bringing the leg into an extended position. The biceps, although functioning, was not well developed, but sufficiently so to be used for the purpose to which we intended to put it. The biceps tendon was freed from its attachment to the fibula, drawn back through the fatty structures, and transplanted into the quadriceps tendon. In that way the biceps would be used as an extensor in place of a flexor. She is learning to use this muscle very well. If I had taken one of the muscles of the internal hamstring group, we would have a much greater distance to span. We dressed the leg in extreme flexion. The result was a very satisfactory one. She is able to use the leg and foot very well now, and as time goes on she will continue to improve. We have had equally good results in our other tenoplasty cases.

CASE II.—BILATERAL TENOPLASTY ON FEET

This is another case of the same class. This woman had a double drop-foot. We did a subcutaneous tenotomy on both the tendo Achillis, and divided and transplanted the tibialis anticus tendon in the same manner as we did in the previous case. This

patient has splendid extension power in her feet, but very feeble flexion power. She did not have any paralysis of the quadriceps group.

We also divided the flexor longus hallucis. You will notice that the feet are well turned out and in good position. The operation was done only two weeks ago, so that sufficient time has not elapsed to show the final result in this case.

There is a very good field for tendon transplantation, and it is really astonishing how much one can do in the way of restoring lost muscle function by merely transplanting one or more tendons, even from an opposing muscle group. However, great judgment must be exercised if one is to be successful in this work, because, otherwise, the wrong tendon may be transplanted or the right tendon may be transplanted to the wrong place. The results obtained in this work are exceedingly gratifying. We have a considerable number of these cases, and while we have not always been able to restore all the lost function, we have succeeded in giving these patients useful limbs.

CASE III.— UNUNITED FRACTURE OF THE TIBIA AND FIBULA: TRANSPLANTATION OF BONE

This little boy, who is now five years of age, had a congenital fracture of both bones of the leg. It was some little time before the fracture was noticed, and when he began to walk there was a considerable deformity of the leg. There was a sharp angulation forward of both bones. The skiagram showed that there was some effort toward the establishment of union. There was considerable callus-formation on the ends of the fragments, but there was no bony union. He was not a very strong boy; his vitality was below par. He had been operated on unsuccessfully twice before he came to us.

We operated on him twice. The first time we did a bone transplantation, taking two fragments from the opposite tibia, and implanting one fragment into the medullary canal of the fragments of the tibia, and the other was contacted laterally with the fibula and splinted to it securely. It is not necessary to place this bone transplant into the medullary canal, but there



Fig. 108.

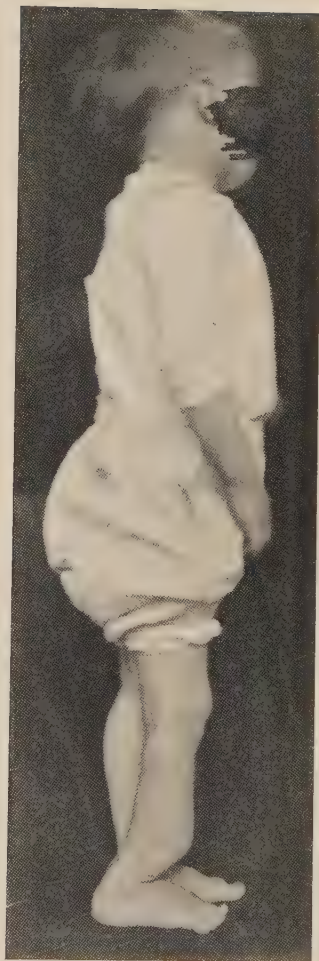


Fig. 109.

Figs. 108 and 109.—Case III: Ununited fracture of the tibia and fibula: transplantation of bone. Fig. 108, position of leg before operation. There is a marked angulation forward in the lower third, and the leg is shorter than its fellow. This can be seen by comparing the position of both knees.

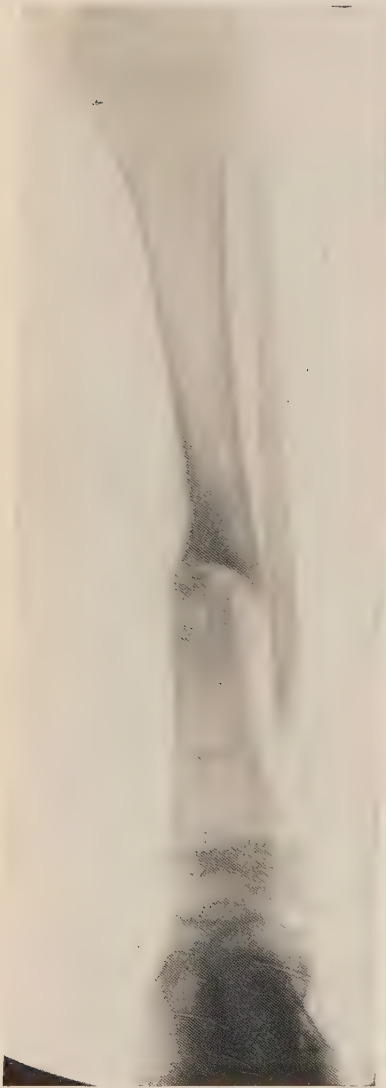


Fig. 110.—Anteroposterior view. There is apparently a bony union of the tibia, but not of the fibula. There is a separation of the fibular fragments and the upper end of the fibula is lower than normal.

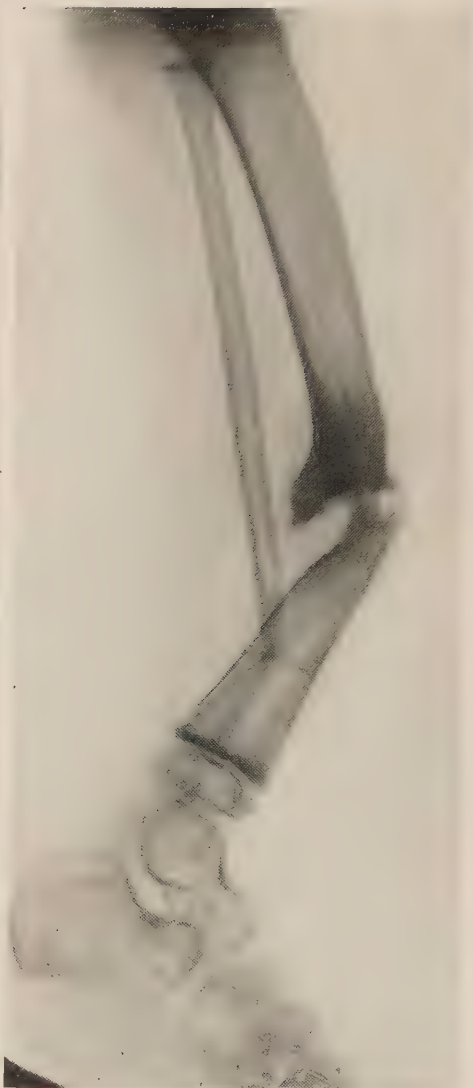


Fig. 111.—Fracture of tibia and fibula, with considerable deformity of leg. There is some effort at regeneration on the lower end of the upper fragment.



Fig. 112.—Anterior view, taken about two months after operation. The alignment of the bones is perfect. The small fragment which was splinted to the fibular fragment is not only in position, but a bony union is taking place with both the fibular fragments. The new-formed bone is seen on the inner (left) side of the transplant. The transplant in the tibia also shows up very distinctly. Regeneration of bone is also taking place here.

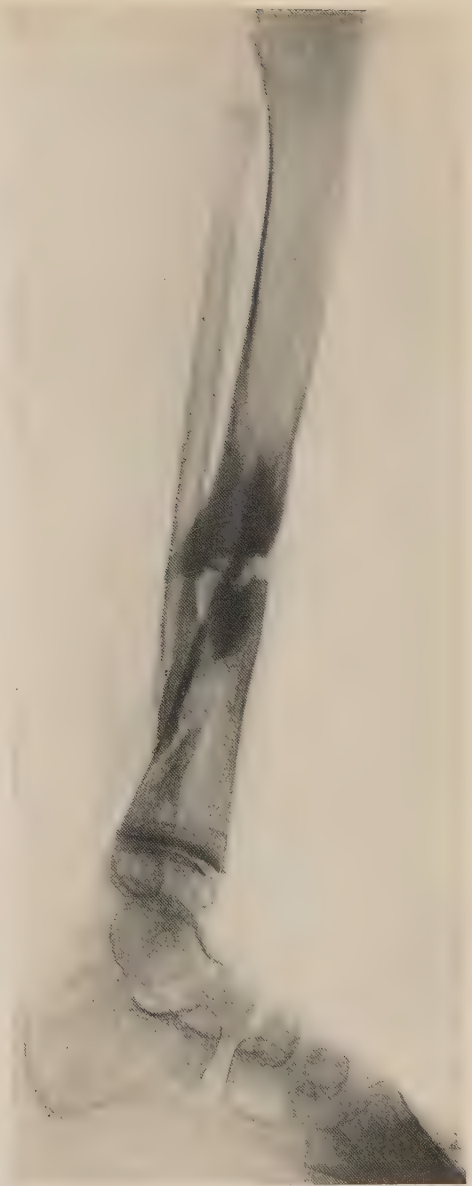


Fig. 113.—Lateral view, showing fracture of the transplant in the tibia, but no deformity.



Fig. 114.—Skiagram taken six months after operation. Anterior view. There is a firm bony union of the fibular fragment. The outline of the transplant can be distinguished in the bone mass. The tibia is not in alinement, and the shadow of the transplant, which is still visible, has an outward curve to it. There is no fracture to be seen in this picture.

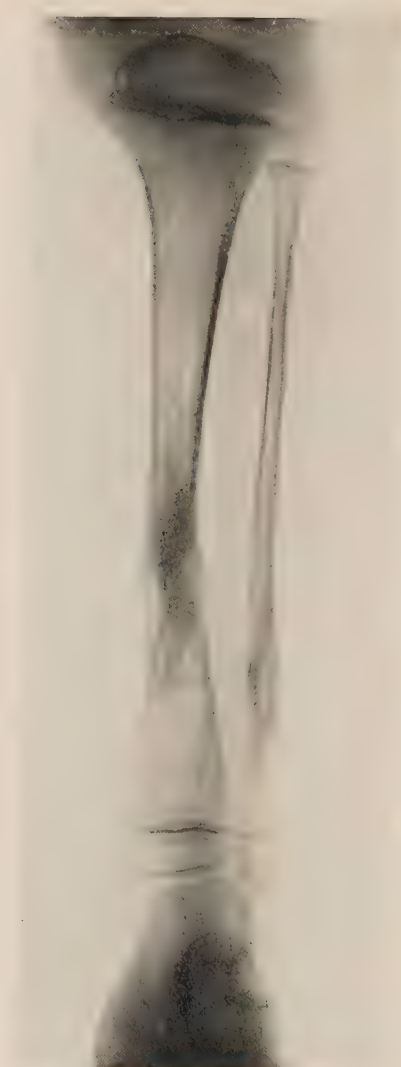


Fig. 115.—Anteroposterior view, taken four months after second operation. There is now a firm bony union between the fragments of the tibia. The transplant is still visible in the tibia. The fibula has reunited solidly. The bones are in perfect alinement.

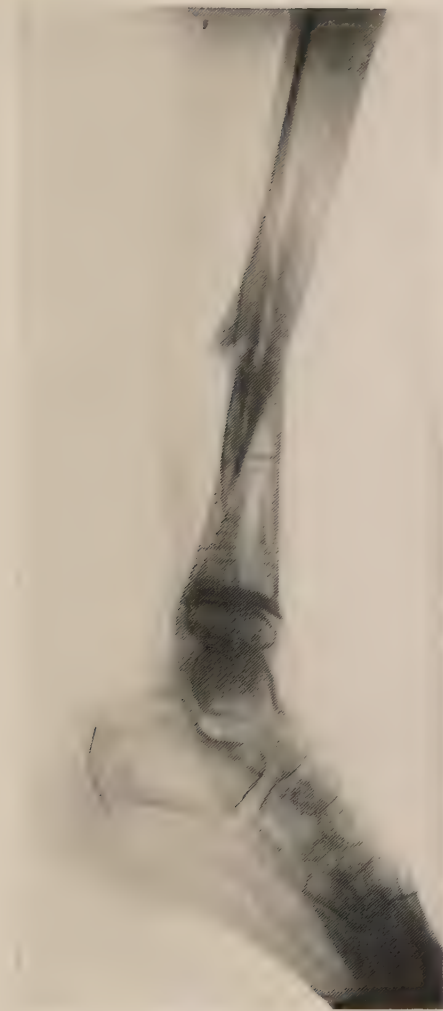


Fig. 116.—Lateral view. Confirms the presence of bony union in the tibia. Bone is in perfect alinement from every direction. The shadow of the fibula can be distinguished in this picture through the tibia. Mass of bone projecting backward (to the left) is on the lower end of the tibia.



Fig. 117.—Photograph of boy four months after second operation. Leg (right) is straight and foot is placed squarely on the ground. This leg is even straighter than the normal leg.

must be an absolutely firm contacting of the transplant with living bone. If that is secured and maintained, regeneration always takes place.

The case progressed very favorably, and when the boy left the hospital, about five months after the operation, there was a firm bony union and regeneration of the new bone was progressing very satisfactorily—so much so that we removed the plaster cast which he had worn up to that time. This was a mistake, because soon after the boy reached home his mother noticed that the leg was not so firm as it was before. She brought him back to us about three months after he had left the hospital the first time, and on making a skiagram, we found that he had sustained a fracture of the transplant at the site of the former fracture of the tibia.

A second operation was performed. Another fragment was removed from the opposite tibia, but instead of placing it in the medullary canal of the fractured tibia, as we did at the first operation, we grooved the tibia and laid the fragment into the groove. The first transplant was not removed; the second transplant spans the gap between the fragments, and being in contact with living bone above and below, without the interposition of periosteum, we were confident that bony union would take place. We were not disappointed in our expectations. The boy has been in the hospital for five or six months now, and it is only very recently that the plaster cast was removed from the leg. He is not allowed to use the leg in any way whatever, and he will be kept here until we are thoroughly convinced that it is safe to let him go home. The skiagram shows a splendid result. New bone is forming rapidly and he will eventually have a useful leg.

CASE IV

Another case similar to the one just cited was that of a boy, eight years old, who had sustained a fracture of the tibia and fibula when he was one year of age. He had been operated on three times unsuccessfully before we saw him. An aluminum splint had been placed in the medullary canal of the tibia at the

first operation, but union did not take place. At the two succeeding operations the fragments were wired, but union again failed to take place. Then he came to us. We did a bone transplantation operation which proved entirely successful.

When Mr. Lane was in this clinic recently he emphasized the fact that the Lane plate was not to be used in cases of non-union. That is true. We must do something more than put the bones in opposition. Bone growth has to be stimulated, and that is what we succeed in getting in this work of the transplantation of bone. In this case, as in the previous case, the fibular transplant was splinted to the fragments, and, as the skiagram shows, there is a solid bony union.

All these cases need is some substance that will conduct the osteogenetic cells across the line of fracture. We use bone taken from the same patient—an autotransplant. We usually do not remove the periosteum from the fragment, not that we believe it is essential to the regeneration of bone, but it is an advantage as a limiting membrane, and until we are convinced that it is entirely unnecessary, even as a limiting membrane, we shall continue to use it.

Of course, in the case of this boy the leg is much shorter than its fellow,—about three inches and a half,—but we feel that some of this shortening will be overcome because the lower epiphyseal line has not been disturbed.

CASE V.—FRACTURE OF THE HUMERUS

This man came in about a year ago with an ununited fracture of the humerus. We did a typical transplantation operation, driving the transplant, which was removed from the tibia, into the medullary canal of the upper fragment, contacting it with a small sequestrum, and placing it in the medullary canal of the lower fragment, one wall of which formed the sequestrum.

The case went along in the usual manner, and after several months the plaster cast was removed. Then it was found that the lower end of the transplant was not united to the lower fragment of the humerus. The man had been working in a laundry and polishing brass work, and evidently had worked



Fig. 118.—Case V: Fracture of the humerus. After second operation. Two screws hold the implant in contact with the wall of the medullary canal of the lower fragment. One screw overrides the fragment.



Fig. 119.—Fracture of the transplant, the result of a violent impact caused by the falling of one end of a heavy object.



Fig. 120.—After third operation. The two fragments of the bone implanted at the first operation are seen on the left of the new transplant placed in at the last operation. This second transplant is secured to the lower fragment by means of two screws. The upper end is wedged in the groove made in the upper humerus fragment.

loose the transplant, so that it was free and union could not take place.

We operated on him a second time, and found that the transplant was firmly united to the upper fragment, but not to the lower. We did not deem it necessary to implant another piece of bone, therefore we secured the fixation of the lower end of the transplant in its bed in the medullary canal of the lower fragment of the humerus by means of three screws. Two of the screws impinged against one side of the transplant, forcing it against the wall of the medullary canal, and the remaining screw overriding it. Thus the approximation of the transplant with living osteogenetic bone and its fixation were easily secured.

About a week ago he was carrying a sofa with a fellow-workman. It was one of those big, heavy, leather sofas. The other fellow dropped his end, and when it struck the floor the entire force of the impact was given to the patient's arm and it fractured. The skiagram showed that it was the transplant that had been fractured. What to do next was the question. To ream out that compact bony tissue of the transplant was not to be considered. We decided to put in a second transplant. We removed a piece from his tibia, and it was placed into a groove that had been made on the external surface of the two humerus fragments. Fixation was secured with a screw. We are sure of a complete regeneration in this case, but we will profit by our previous experiences with this man and keep that arm in a plaster cast for many, many months. [This patient had a splendid result. The fragments became firmly embedded and united with the surface of the humerus. The skiagram shows that there is a bony union of the fractured primary transplant.—Ed.]

(For a full description of the two previous operations, see CLINICS, vol. i, p. 875.)

CASE VI.—OSTEOMYELITIS OF THE TIBIA WITH COMPLETE
DESTRUCTION OF THE BONE AND AN OUTWARD DISPLACEMENT
OF THE UPPER END OF THE FIBULA

This is a case which we at one time thought was going to be a failure. We had, up to the time we saw this patient, 100 per

cent. of successes with our transplant work, and for a while we announced this as the one and only failure. We were mistaken in that supposition, however, because the case is not a failure, so that we still have 100 per cent. of successes.

We have operated on this boy twice. When he first came to us we did the primary operation, which we always do in a case of this type before the bone transplantation is done. The skiagram shows that the upper end of the fibula had become dislocated outward and upward on the tibia a distance of about one inch. This deformity and shortening had to be overcome before the transplantation was made, and we had to maintain the length of the leg. We secured this result by transplantation of the upper end of the fibula into a socket prepared for it in the upper end of the tibia. We sawed off the head of the fibula just below the epiphyseal line, and transplanted it into the excavation made in the outer side of the tibia, just below the epiphysis. The fibula was secured in this position by means of a nail driven through it into the tibia. The fibula will give support to the leg and maintain its length. The epiphysis of the fibula having been removed, it leaves only the tibial epiphysis from which bone growth can take place.

We waited until union between the fibula and tibia had taken place before attempting the second operation, at which we intended to do a transplantation. When we were ready to begin the operation we were informed that the boy had an acute bronchitis. We did not operate. We waited for two weeks before we felt it would be safe to undertake the operation. At the second operation we transplanted a fragment of bone taken from the opposite tibia into the gap in this tibia. It was 18 cm. in length. It was driven into the medullary canal of the upper fragment, and contacted for a considerable part of its length with the lower fragment, which, as may be seen in the skiagram, was of such shape that it did not seem wise to do anything else than to approximate it laterally with the transplant for some of its length.

Immediately afterward the boy had an elevation of temperature, and from the fact that pus was discharging freely from the

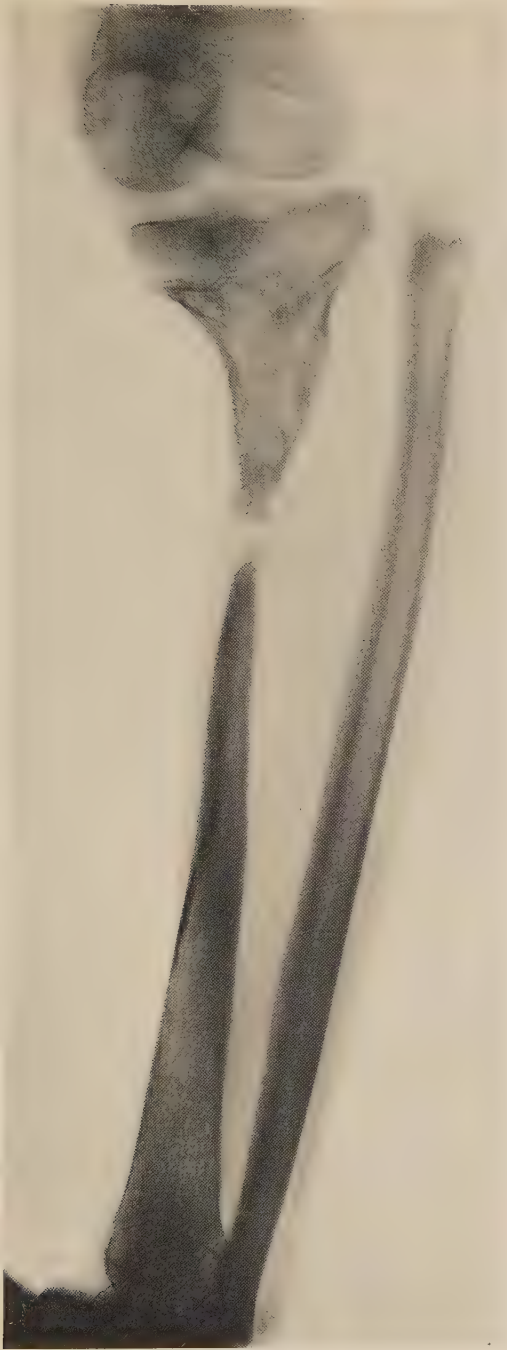


Fig. 121.—There is a separation of the tibial fragments of about one-half inch. The fibula is dislocated outward at its upper extremity, and higher than normal. There is much destruction of the shaft of the tibia.

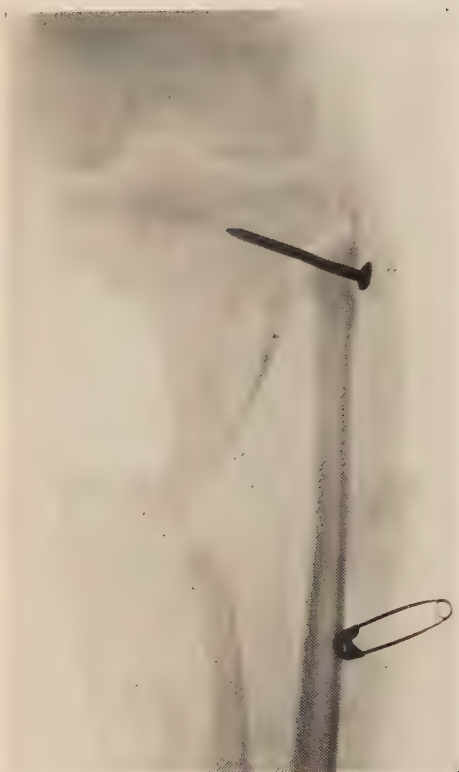


Fig. 122.—This skiagram was taken immediately after the first operation, and shows fibula nailed to the tibia just beneath the epiphysis of the latter, the epiphysis of the fibula having been removed.



Fig. 123.—Three months after implantation of the fragment from the opposite tibia. There is some absorption of the implant at the gap between the fragments, but bone regeneration is taking place, as can be seen at the lower portion of the implant and at the lower end of the upper fragment. Fibula is firmly united to the tibia.

leg we were convinced that he had a hematogenous infection at the site of the operation, the result of his previous bronchitis, which evidently was of influenzal origin. We found the *Bacillus influenza* in the sputum. We felt that the bone graft would be destroyed, but by overcoming the infection we succeeded in saving the graft. We made an incision into the leg a few days ago to see whether the graft was dead, and were very much pleased to find that it is alive. It bled freely when the point of the knife entered it. Evidently the infection was not a very virulent one. The result in this case will undoubtedly be a most satisfactory one, although there is no bony union between the upper end of the transplant and the upper fragment.

CASE VII.—SARCOMA OF THE SHOULDER: REMOVAL OF THE SCAPULA

This patient was operated on about six months ago. The trouble started as a "mole" on the spine of the scapula, which some friend playfully struck. That was the only trauma that was sustained, so far as she remembers. From that time on the growth of the tumor became very evident.

My late associate, Dr. Lemke, had one of these little "moles," and when he was ill one time he traumatized it. It immediately began its malignant course. Five weeks later he was operated on, and in another five weeks he was dead, showing how very malignant these tumors are. Dr. Lemke's tumor was of the melanosarcoma type. This patient's tumor was the type of sarcoma originating in the periosteum.

We removed the entire scapula in this case, going in from in front, first taking off the long head of the biceps and the coracobrachialis, and then going in from behind and removing the scapula. We freed the attachments of the muscles very carefully and fixed them to the acromion process. This lady has very good use of her arm. She can flex the forearm and extend it with perfect ease. She can do her own hair; she can button her collar. She cannot bring the arm out on a line with the body very far, that is, abduction is limited. She plays the piano as well now as she did before the operation. There is, of course,

a little deformity. The shoulder is not so wide as its fellow, but when she is dressed even that is not apparent.

There is no evidence of recurrence now, and we hope that there will be none. She is feeling perfectly well and has gained in weight.

CASE VIII.—ANKYLOSIS OF THE KNEE

This young man had a complete bony ankylosis of his knee of fifteen years' standing, the result of a metastatic arthritis followed by a purulent infection. The femur and the tibia were united the full width of the joint, so that there was nothing at all left of the joint, and the worst of it was that the leg was flexed to nearly right angles.

This ankylosis, like a majority of ankyloses, was avoidable, but in this case it was inevitable because the boy wore a plaster-of-Paris cast on his leg for two years with the knee flexed to nearly right angles. The patella had fused with the femur.

We were obliged to make an entirely new joint, restoring the normal conformation of the articular ends of the femur and tibia, chiseling through the line of bony union between the femur and the patella, and interposing fat and fascia pedicled flaps between the bones to prevent a recurrence of the ankylosis. Formerly, we made a curved transverse incision across the knee on a line with the upper surface of the tibia, but because of the occurrence of gangrene in the tip of the flap in one or two cases we abandoned that incision, and we now make two longitudinal incisions, one on each side of the patella, as was done in this case. That gives us a very good exposure of the joint, and insures perfect and early union of the flaps after operation. We have not had any flap necrosis since we are making these two incisions.

After we have exposed the joint we chisel through the bony union, remove the new formed bone, and refashion the ends of the bones to as nearly a normal contour as is possible by means of a curved chisel. The condyles of the femur, the concavities in the tuberosities of the tibia, the intercondyloid notch, ridge, and spind, are remade, so that full and complete anatomic conformation of the bone-ends is obtained in the joint; the leg is plumb,



Fig. 124.

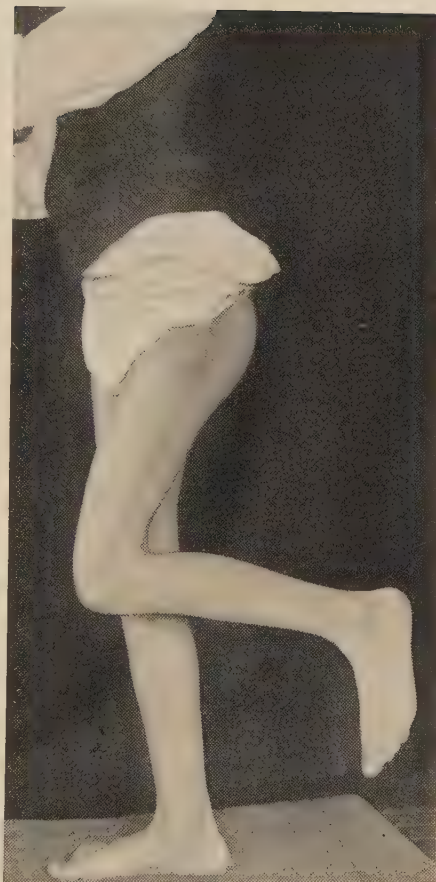


Fig. 125.

Figs. 124 and 125.—Case VIII: Ankylosis of the knee. Position of the leg before operation, front and lateral views. Shows flexion to little more than right angles.

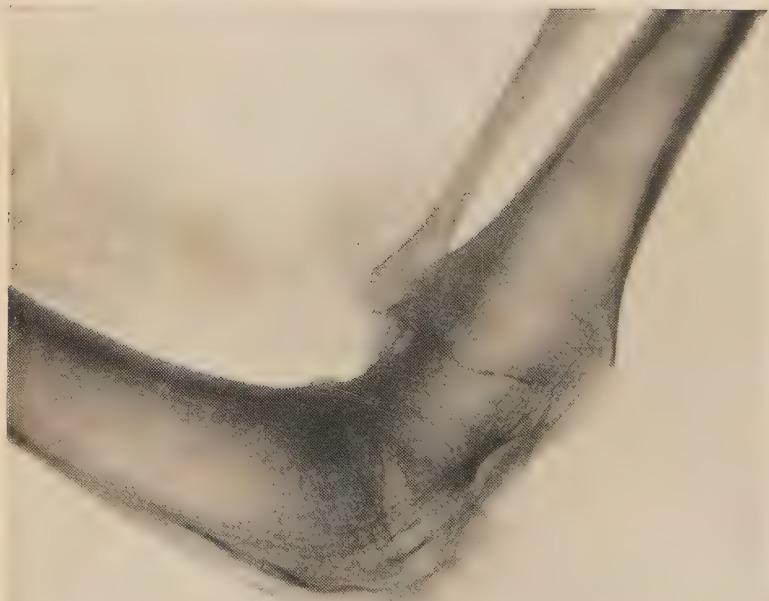


Fig. 126.—Skiagram taken just before operation, showing complete bony ankylosis between femur and tibia, the full width of the joint; likewise a bony union between patella and femur, the patella being placed low down on the femur. There is also a slight curvature of the lower end of the femur.



Fig. 127. Skiagram taken about one month after operation. Leg is straight and position of bones is good. The fibula is seen to be higher than normal, because of the bone which had to be removed from upper end of tibia to make room for the interposing flaps. The bones are more prominent behind than normal, because of the position and curvature of the femur be-

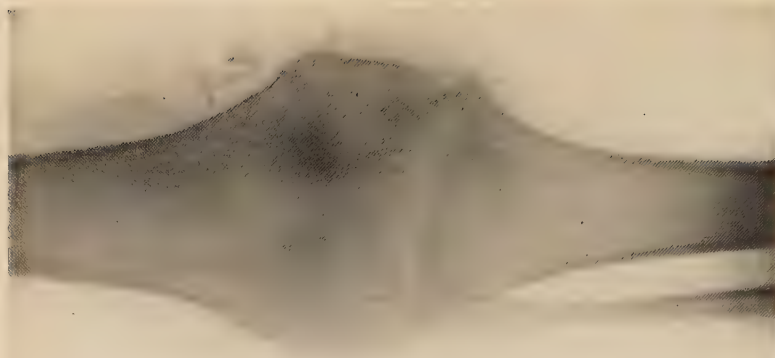


Fig. 128.—Anteroposterior view shows the new joint, the intercondyloid ridge on the tibia, and the reformation of the condyles of the femur.

and the joint possesses as much stability as it did before the ankylosis occurred. The details of the method we have described so often that you are doubtless sufficiently familiar with them to make a repetition unnecessary at this time.

The next step is to interpose the two pedicled flaps, an inner and an outer, taken from the subcutaneous fat and fascia and the remnants of the capsule. These flaps are laid across the upper surface of the tibia, so as to overlap in the midline, and are then carefully sutured in place with chromicized catgut.

The patella was freed from its attachment to the femur and was rotated on its axis 180 degrees, so that the prepatellar bursa became the lining or covering of its articular surface, entered into the formation of the new joint, and effectively prevented the recurrence of the ankylosis. All that remained to be done then was the closure of the skin incision.

It is now five weeks since this operation was performed, and that is why motion is somewhat difficult, although not especially painful. Remember, that for fifteen years he was unable to use any of the muscles which move this joint. He is now twenty years of age, so that when the trouble occurred, he had hardly fully developed his muscle action. We are, however, going to give him a good movable joint with the power of flexion beyond right angles, which is a wonderful improvement on his former condition.

CASE IX.—MULTIPLE ARTHRITIS

This patient is the wife of a physician. She has suffered from rheumatoid arthritis for ten years. She was disabled completely; nearly all the joints were involved—the knees, ankles, elbows, wrists, and the small joints of the fingers. She suffered great pain, and the joints had become deformed, so that she was unable to do anything at all. She is going home now, feeling well and free from pain or discomfort and with useful joints.

This case is a very good illustration of what can be accomplished by proper treatment. The only treatment we gave this lady was to inject into the joints a 2 per cent. solution of formalin in glycerin. This solution is not used until it is at least twenty-

four hours old, although it may be older than that. It should be shaken often, so that when it is used the formalin and glycerin have mixed thoroughly. The injection is always made under gas anesthesia. The amount of the solution injected varies with the joint involved. In the case of the knee we inject 15 c.c.; the elbow, wrist, and ankle, 4 c.c.; and the smaller joints, 1 c.c. Immediately after the injection is made the joint is manipulated freely, so that the fluid is disseminated, and then a Buck's extension is applied with a weight attached. In the case of the knee we usually put on about 15 pounds, and considerably less in the case of the smaller joints; however, just how much weight should be applied will depend on the muscular development of the patient, because the weight is put on for the purpose of overcoming the contraction of the muscles, so as to keep the joint surfaces separated as far as possible.

These injections may be repeated once a week as often as is necessary. After the first injection, when the needle enters the joint, a negative pressure is made on the syringe. This shows whether the needle is in the joint cavity, and also the degree of the reaction which has followed the previous injection. If the needle is in the joint, a serosanguineous or purulent fluid will rise on the glycerin. We always use a screw syringe for making these injections, because it is very difficult to force glycerin through a syringe needle even when it is as large as the one we use—about the size of a knitting-needle.

The result from these injections is seen in this case. The patient has freely movable joints, with no pain or discomfort, and she is able to help herself as well as she ever did before this trouble began. We have had a large number of these cases, and the results have always been exceedingly satisfactory, providing there has been no bony ankylosis preceding the application for treatment.

CASE X.—TRIFACIAL NEURALGIA: DIVISION OF THE NERVES

This man has for a number of years suffered from severe trifacial neuralgia. He has been operated on before. He told us, when he came to the hospital, that an attempt was made to

remove the ganglion, but the operation was not concluded. He did not know what happened. I presume it was severe hemorrhage; however, it made the operation which we performed a really difficult one.

These cases can be treated in a variety of ways: First, there is the injection method; second, the division method with the injection; these are extracranial procedures; third, the intracranial types of operation, the division of the roots inside the foramina, and the closing of the foramina with heterogeneous material, such as the rubber tissue of Abbe, the screws of Mayo, the ligatures, the wax plug of Murphy. Next is the removal of the Gasserian ganglion by the Hartley-Krause method,—and finally the removal of the sensory root of the ganglion—Frazier's method.

Osmic-acid injection is the plan we usually resort to first, with the division of the nerve at the intracranial foramina. It gives a relief varying from fourteen to eighteen months. Patients who have gone as long as seven years without recurrence are considered cured. A number of them have gone three years, a smaller number four years, but the average case recurs in from fourteen to eighteen months. The second osmic-acid injection gives about the same period of relief as the first. The third and fourth injections are not so successful. The alcohol injection gives relief for from six to ten months. Whether the injection is given above the zygomatic arch or below, it seems to make but little difference. To us the injection below the zygomatic arch seems a safer and more certain procedure.

We have done altogether some 16 or 18 Gasserian-ganglion removals, that is, complete removals, securing in all cases in which we have been able to get reports permanent relief. It is the desirable operation if it can be executed, but we have found it difficult to execute on account of the bleeding, and therefore we have resorted to the easier and safer procedure of intracranial extradural exposure of the inferior and superior maxillary division of the nerve. We have divided them and placed a paraffin or wax plug a little larger and thicker than a nickel over the foramina, and pressed it in and firmly interposed it between the divided ends of the nerve in that position. The pivots

which are made by pressure of the paraffin prevent the material from sliding, and those pivots are in the foramen ovale and foramen rotundum. The superior maxillary division is not disturbed in this procedure.

In the removal of the Gasserian ganglion the roots are not divided until the upper layer of the dura is entirely freed from the ganglion; then the roots are divided and the Gasserian ganglion evulsed, holding both of the roots in the same root-retracting forceps, which is of the pattern of the Mayo cystic or common-duct forceps. It makes a splendid evulsor, for the depressed root is removed when it passes through the upper half of the dura on the surface of the ganglion, and then backward and upward over the temporal elevation until the posterior root is seen shining in the field. This is hooked up with a blunt hook resembling that used by Alexander in extracting the round ligament, or by the oculists in doing myotomies on the eye-muscles. When the root is thoroughly hooked, traction is made on it. It is not cut off—just simply dropped, because it has been detached from its central position; it never reunites because there is a permanent degeneration of the part, that is, the axons of the pons, having no neurilemma, are permanently incapacitated, as was shown in the experiments of Frazier.

A starch headcap is put on these cases and not removed for two weeks.

CASE XI.—ABSCESS OF THE LIVER

This patient is under the care of Dr. Milton Mandel, and I have asked the doctor to discuss the medical phase of the case. He asked me to see the case with him this morning.

DR. MANDEL: The patient I am presenting entered the hospital in the medical service February 17th. She is an Italian, thirty years of age, and does not speak English, so that her history is necessarily incomplete. Four days previous to entering the hospital patient had a chill lasting twenty minutes, followed by a pain in the right axillary region, which was aggravated by coughing, breathing, and moving. She also had a cough, which at first was unproductive, and a high fever.

Physical examination made on the day of entrance revealed a lobar pneumonia involving the right lower lobe, and a slight transverse enlargement of the heart, with accentuation of the second pulmonic tone. Abdominal examination was entirely negative. Temperature, 103° F.; respirations, 40; pulse, 120; leukocyte count, 20,000.

February 19th the patient had what was apparently a crisis. Temperature, pulse, and respirations dropped to normal, and the toxemic disturbance, which had been intense, rapidly subsided. For ten days she continued to improve; temperature remained normal, strength increased, and appetite returned. She was apparently convalescing rapidly.

February 26th she again developed a cough, which on the following day was productive. The expectoration was of brick-dust color, and distinctly purulent, but absolutely odorless. Examination of the lungs at this time failed to reveal an explanation.

February 27th, at 8 P. M., the patient had a chill, and the temperature, which had been normal for ten days, was 103° F. I saw her at 10 P. M. She was greatly prostrated, temperature was high, pulse 140 and thready, respirations very rapid and shallow. With the exception of distant and somewhat high-pitched breath-tones over the right lower lobe posteriorly, lung findings remained negative. The liver, however, which previously had not been palpable, was now distinctly enlarged and extremely tender. This was especially marked on making pressure upward on the lower ribs from behind. These abdominal findings were positively not present forty-eight hours previously.

Regarding diagnosis, several conditions must be taken into consideration: Inasmuch as this complication, if it is a complication, is postpneumonic, we would naturally think first of lung abscess or empyema. However, I think we can exclude both conditions by the history alone. It is well known that in postpneumonic abscess or empyema the temperature approaches or may reach normal, but in a few hours again becomes elevated, and later of a hectic type. In abscess we get the mouthful

expectoration of offensive pus entirely unlike that which this patient evacuated, and usually the physical signs of cavity. Empyema would give us the findings of an effusive pleurisy. Delayed resolution, gangrene, and echinococcus need not be seriously thought of. We must, therefore, consider conditions below the diaphragm to explain the picture, and I have absolutely no hesitancy in making a diagnosis of liver abscess rupturing through the diaphragm and into a bronchus.

It is hard to conceive how she got her abscess. She has never had dysentery (amebic or bacillary), typhoid, or any other gastrointestinal disturbance. It is not likely that the inflammatory process extended from the lung through the diaphragm into the liver. It would be possible, in a case of pneumococcus sepsis, to have a metastatic focus in the liver, but I do not believe that this has occurred, as the pneumococcus infection had apparently entirely subsided. There have been no evidences of empyema, of gall-bladder or septic cholangitis, so that extension by contiguity can be excluded.

I believe, therefore, that we are dealing with a liver abscess. Where it came from I do not know. It is barely possible that at some time in her life she had a dysentery which was not diagnosed.

The condition of the patient this morning does not permit of an extensive examination. You will note, however, that she is icteric, that the edge of the liver extends a hand's-breadth below the costal arch, and that she flinches on slight pressure or heavy percussion.

VISITING DOCTOR: Might it not have been a liver abscess from the beginning?

DR. MANDEL: No, sir! The physical findings were typical of pneumonia. The leukocyte count, which was above normal, dropped to 8000 after the crisis. This morning it is 30,400. Furthermore, the original diagnosis was confirmed by blood culture. This condition developed in the last forty-eight hours. The abscess may possibly be of long standing. They are sometimes quiescent for long periods.

DR. MURPHY: She came into my service today. What will

I do? That woman has just had a rupture of the abscess into the lung. This is the condition exactly. The tension of the abscess has been relieved by this rupture into the lung. If we operate now—today—she will die. We have learned from Dr. Ochsner that when they are in that acute stage they should be tided over, possibly for a week or ten days, before the abscess is opened. That is the real situation. That removes the most dangerous symptoms; then you can operate with not one-twentieth of the risk, not even one-fiftieth of the risk, that you would have if you operate today. I think the diagnosis is correct. It is a liver abscess. The surgical management must be to wait until she has regained her strength, now that the tension is relieved, before attempting any operation.

Other cases shown were the following:

CASE XII.—RHEUMATOID ARTHRITIS

Here is an example of another class of cases—a rheumatoid arthritis. This man is a farmer. He was working on his farm when he had a chill, after which he developed rheumatoid arthritis. He was badly crippled. Previous treatment was ineffective. His knees were so badly crippled he could just hobble around on crutches. We gave him injections of formalin and glycerin and of mixed vaccines. We did not know what type of infection he had had, so that we could not make an auto-genous vaccine, which we always do when we know the type of the infection and can make a culture. We gave him the mixed vaccines, and the reaction was so great that we thought he was going to die, showing that the vaccine was just what he needed. If you do not get a reaction following the injection of any vaccine, you are not in the zone of the type of bacteria which produced the infection. The reaction must be a definite one. This man has had only one injection of formalin in glycerin in each knee, and following the injection we put on a Buck's extension. What I want to call attention to is the fact that the vaccines nearly killed him. He had a temperature after the first injection of something like 105° F. He improved rapidly under the vaccine treatment, and he is now able to use all his joints with per-

fect freedom of motion. He is free from pain or discomfort, showing what vaccines will do. We use them very extensively in our work. We prefer the autogenous vaccines and always use them when we can.

You can give tuberculin to a non-tuberculous patient in doses of 1000 minims of a 10 per cent. dilution and get no result, but give a large dose to a tuberculous patient, and see what happens: the patient will almost die from the reaction. I recall a case where a doctor wrote me about what dose of tuberculin he should give a patient. I asked one of my assistants to send him the instructions, but the doctor did not wait to receive them. He went to a drug-store, bought a bottle of Koch's old tuberculin, full strength, and gave the patient the full bottle—fifteen minims. He called me up that night because the patient was unconscious, with a temperature of 106° F. She remained unconscious for five or six days, but she did not die.

(Cases XIII and XIV will be published in full later.)

CASE XV.—OSTEOMYELITIS OF THE TIBIA WITH EXTENSIVE DESTRUCTION OF THE BONE.

(See CLINICS, vol. ii, pp. 305-312.)

CASE XVI.—CHONDROSARCOMA OF UPPER END OF FEMUR.

(See CLINICS, vol. i, p. 299.)

CASE XVII.—DISLOCATION OF SHOULDER.

(See CLINICS, vol. ii, pp. 413-420.)

CASE XVIII.—SARCOMA OF UPPER END OF TIBIA.

(See CLINICS, vol. i, p. 299.)

CASE XIX.—OSTEITIS FIBROSA CYSTICA.

(See CLINICS, vol. i, p. 555.)

CASE XX.—DIVISION OF THE BRACHIAL PLEXUS WITH SUTURE: RESTORATION OF FUNCTION.

(See CLINICS, vol. ii, p. 259.)

CASE XXI.—PLASTIC OPERATION ON EAR.

(See CLINICS, vol. ii, p. 389.)

CASE XXII.—ARTHROPLASTY ON HIP.

(See CLINICS, vol. ii, p. 449.)

CASE XXIII.—FRACTURE OF ANATOMIC NECK OF FEMUR.

(See CLINICS, vol. ii, p. 421.)

CASE XXIV.—FRACTURE OF HEAD OF FEMUR.

(See CLINICS, vol. ii, p. 22.)

CASE XXV.—FRACTURE OF THE NECK OF THE HUMERUS.

(See CLINICS, vol. ii, p. 137.)

CASE XXVI.—FRACTURE AND DISLOCATION OF THE CARPAL BONES.

(See CLINICS, vol. ii, p. 393.)

CASE XXVII.—ANKYLOSIS OF JAW.

(See CLINICS, vol. i, p. 905, and vol. ii, p. 405.)

CASE XXVIII.—DISLOCATION OF SEMILUNAR CARTILAGE.

(See CLINICS, vol. ii, p. 435.)

ACUTE SUPPURATIVE PROSTATITIS

Early Drainage into Urethra; Subsequent Leakage through Capsule, with Infection of the Perirectal Tissues; Ischiorectal Abscess; Incision, Breaking Down Partitions between Pus-pockets, and Drainage; Unimpeded Recovery

HISTORY

DR. MURPHY: This case is referred to me by Dr. Edward F. Wells, of this city, who is present this morning. I will ask the doctor to take up the history of the case.

DR. EDWARD F. WELLS: The patient is sixty-two years of age, 5 feet 4 inches tall, and ordinarily of 215 pounds weight. Had a Neisserian infection in early life; at thirty-eight had severe nephritic colic. At fifty-three he suddenly became jaundiced, which soon became profound; there was tenderness over the gall-bladder, without pain or fever. After four months he had, January 16, 1905, a severe chill, with temperature reaching 104° F. This was accompanied and followed by a profuse, gradually lessening, flow of saliva. The pulse was 62; leukocyte count, 8800, with 63 per cent. of polynuclears; sugar was absent from the urine; the gall-bladder was greatly distended, as shown by palpation and a radiogram; following a test-meal the stomach-contents contained a normal amount of free and combined HCl, with moderately reduced motility; the systolic blood-pressure was 125; his weight was 182 pounds.

In February, 1905, he was operated on by Dr. Murphy. The gall-bladder was greatly distended and discharged an enormous quantity of bile; it was anastomosed to the transverse colon by means of the Murphy button; no calculi were found in any of the bile-ducts; but the common duct was completely obstructed

as it passed through the head of the pancreas; the pancreatic caput was greatly enlarged, very hard, and was supposed to be affected by a malignant growth. Recovery from the operation was fairly rapid, and he soon regained his former weight. For several years the bowels remained uncomfortably loose, with, very gradually, a partial accommodation to the new anatomic conditions. In April, 1911, he had a severe cholecystitis, with chills, fever, leukocytosis, tenderness, prostration, slight jaundice, and rapid loss of weight. In November last, while out of the city, he had chills, fever, and epigastric distress for several days.

During the night of December 17, 1912, he was awakened by a severe chill, followed by temperature of 103° F., pains in the back, and frequent micturition. When seen the following morning, urine was voided only with difficulty and much pain; the urine contained considerable pus and many red blood-corpuscles; the prostate was notably enlarged and exquisitely tender to the palpating finger; the temperature was 102° F. The fever subsided; the frequent, painful, and difficult urination continued to be more or less distressing until January 24, 1913, when he was unable to void urine. At this time 18 ounces of urine was removed by the catheter, since which time he has passed no urine voluntarily. A few days before beginning the use of the catheter, and subsequently, the urine contained but little pus, and the rectal palpation of the prostate became more painful. Daily the bowel movements increased in distress, and since the evening before last there has been a throbbing rectal pain, with a notable swelling to the right of the rectum. There is a moderate leukocytosis, with no increase in the proportion of polynuclears, and there is no material elevation of the temperature.

COMMENTS AND OPERATION

DR. MURPHY: I wanted the whole history of this case because my recollection of it was that I thought his primary lesion in 1905 was probably a carcinoma of the pancreas and I wanted to put myself on record because I was mistaken. When we operated on him we found an enlarged gall-bladder, which we anastomosed to the transverse colon. This condition subsided

as soon as the gall-bladder was drained. The obstruction of the common duct was probably due to an acute infection of the pancreas. There was no stone to be found at that time. We always drain these acute infective cases. Years ago, in our original article on this subject, we stated that these cases should be drained. Doing cholecystectomies for obstruction to the common duct were unheard of up to that time. Now we have developed gall-bladder surgery to such a degree that we remove everything. Draining the gall-bladder into the large intestine with the button is the method that Kocher advises. At that time it was feared that that procedure would cause an infection of the bile-ducts, but there is not one single recorded case where such an infection occurred. When the drainage through the ducts is free, there are multitudes of infective microorganisms that come in and go out of them. That is in consonance with our clinical observations and results.

An interesting feature in the case today is that this man had an infection in his prostate which has extended into the peri-proctéal tissues. You can see how this and the irritation of the bladder produced considerable quantities of pus in the urine.

The question is, did the infection extend from the prostate into the bladder, or did it remain localized between the bladder and the prostate? We are going to examine him under anesthesia. Will I find the infection leading from the prostate into the perineum and is there a sinus leading back into the intestine? These are the points which I have in mind at this time. Occasionally, an ischio-rectal abscess comes through the lower part of the perineal ligament and appears in the perineum. These cases are not difficult to handle unless they are tubercular in origin. When the abscess is in the cellular tissue and the perineal ligament, it is usually extremely wicked. When the infection passes through the ligament or through the floor of the rectum into the peri-proctéal tissue, the operation is not nearly so difficult. Judging from the position of the abscess, I would say that it is a proctéal lesion. If this was a man of thirty or thirty-five, it would not be a serious case, but in a man of sixty-two it is a

serious lesion. Every infection of colon bacillus type in that portion of the body is serious.

We are going to dilate the sphincters first. The infiltration is high up—as far as I can reach. The pus is escaping from the prostate. I cannot feel any place where the rectum is fixed to the prostate. This infection is coming from the prostate. It is a urinary infection, rather than a rectal infection. That is not so bad for the patient.

There is the pus flowing out on my finger. That gives you an idea of the size of the pus-cavity. There is an infiltration of all this tissue which I dislike very much. There are a number of pockets of pus here which I can feel with my finger in the rectum. I feel convinced now that this is a prostatic infection. We will put in a rubber drainage-tube. What have his toxic symptoms been?

DR. WELLS: He had no fever until yesterday. All you see is of recent development.

DR. MURPHY: I believe this lesion started from his prostate. I think our interpretation was correct, namely, that the pus was not present in the beginning—that the pus which appeared in the urine was from a prostatic infection that was draining into the bladder. His chances are enormously better than they would be if he had a phlegmon of colon-bacillus origin. What was the leukocyte count?

DR. WELLS: The leukocyte count a month ago was 10,000.

DR. MURPHY: That is important always in cases where you have no temperature response. Many times the leukocyte count tells the story of the infection. Many times there is a leukocytosis when there is no temperature response to the infection. The drainage-tube will be fixed to the skin with a silk-worm-gut stitch.

[Following the operation there was a moderate drainage of bloody serum, with but little pus. The swelling quickly subsided; after the fourth day the urine was voided naturally; the drainage-tube was removed in a week, and healing rapidly ensued; recovery complete.—ED.]

SAUNDERS' BOOKS

— on —

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